NJIT New Jersey Institute of Technology

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE

CHEM 243-102 – Organic Chemistry I
Spring 2024 Course Syllabus

All students should be familiar with the **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.

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"*

In the event of a shift to remote and converged teaching due to the COVID-19 pandemic was required, both instructors and students must make changes to their normal working protocols for courses. Students are asked to practice extra care and attention in regard to academic honesty, with the understanding that all cases of plagiarism, cheating, multiple submission, and unauthorized collaboration are subject to penalty. Students must properly cite and attribute all sources used for papers and assignments. Students may not collaborate on exams or assignments, directly or through virtual consultation, unless the instructor gives specific permission to do so. Posting an exam, assignment, or answers to them on an online forum (before, during, or after the due date), in addition to consulting posted materials, constitutes a violation of the university's Honesty policy. Likewise, unauthorized use of live assistance websites, including seeking "expert" help for specific questions during an exam, can be construed as a violation of the honesty policy.

COURSE INFORMATION

Course Description: 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.
Number of Credits: 3

Prerequisites: CHEM 126 with a grade of C or better

Instructor: Dr. Christopher DeSantis
Office: Tiernan Hall (TIER) B006 (in basement)
Email: cdesanti@njit.edu or christopher.a.desantis@njit.edu

Webex URL	https://njit.webex.com/meet/cdesantinjit.edu

Lectures: Tuesday: 6:00 – 8:50 PM Cullimore Lecture Hall 2

OFFICE HOURS: In Tiernan B006 (basement). Tuesday 4-5PM. Thursday 2-5PM.

Also available by appointment.

Webpage: The course website is available through Canvas, which can be accessed via the njit.edu. Please email me immediately if you cannot access the class site. All materials including lecture summaries, quizzes, any PowerPoint slides, and other documents will be posted on the class site. Please check the site frequently for new materials and announcements. All grades for this course will be posted to Canvas on a regular basis. You are responsible for all

updates posted to Canvas, and if you find any mistakes in content or grading, or you need help accessing these materials, please contact your instructor as soon as possible.

Required material and other resources:

- Aktiv Chem: A $28 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 laptop with access to canvas and webex, Respondus Browser, and the textbook.
- 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.
- Molecular model kit: This is a highly suggested purchase. Molecular models will be allowed during the exams.
- Additional Resources: Organic Chemistry 10th edition (2023) by John McMurry. ISBN-13: 978-1-951693-98-5 Openstax. Free textbook and practice problems can be found using this url: https://openstax.org/details/books/organic-chemistry?Student%20resources

University-wide Withdrawal Date: The last day to withdraw with a W is Monday April 1st. It will be strictly enforced.

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. Convert 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. Use the curved-arrow formalism to describe the mechanisms of reactions.
7. Identify various functional groups in organic molecules, particularly alkenes, alkynes, alcohols, acids, ethers, esters, aldehydes, ketones and amines
8. Explain Lewis acid-base theory
9. Explain rules of nomenclature to describe the various hydrocarbons
10. Describe structural and geometric isomerism and the role of isomerism in determining molecule structure
11. Describe types of intermolecular forces
12. Apply knowledge of intermolecular forces to describe trends in boiling points and melting points of various molecules
13. Distinguish between conformers and isomers
14. Describe key reactions of alkanes (substitution), alkenes and alkynes (addition)
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 diastereomers
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, and mass spectrometry to determine the structure of molecules
25. Predict the expected signals in IR, NMR, and MS from given functional groups

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

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 grade in this course will be determined as follows based on the tentative point total and scale:

In Class Worksheets (11x)	110
Participation – CIQ (14x) + In Class Polling (14x)	28
Homework (13x on Aktiv Chemistry)	65
Synthesis Challenge	50
Pre-Chapter Assignment (9x)	27
Quizzes (3x)	75
Exam I	100
Exam II	100
Exam III	100
Final	250
Total Points	905

A	814 > pts.	**C**	633 ≥ pts.
B+	769 ≥ pts.	**D**	543 ≥ pts.
B	724 ≥ pts.	**F**	543 < pts.
C+	678 ≥ pts.		

You must maintain an average of 35%, which is 218 points, in the exam and quizzes to be considered for a grade of D or higher. You will receive an F even if you have adequate point total without this requirement.

Participation: Attendance at classes is **highly recommended**. Each class is a learning experience that cannot be replicated through simply "getting the notes." This is also a highly compacted course and even one absence may cause a steep drop in course performance. Absences for unavoidable legitimate reasons will be permitted upon presentation of appropriate supporting documentation to the Dean of Students. During lectures, students will be tasked with answering polled questions. Students must answer at least ½ of the questions presented to earn participation credit. Poll participation will be worth 14 points of the total grade. At the end of each lectures, students will be required to complete a "Critical Information Questionnaire" (CIQ) short answer survey which will be worth 1 pts each in Canvas (14 pts total). The purpose of the CIQ is to provide a way for students to give feedback and alert the professor of an items which may need further clarification or to provide the professor with an understanding of what works best for students to maximize learning. **"Critical Information Questionnaire" survey must be completed by 11:59PM the Wednesday after class.** CIQs with incomplete or low-quality answers will not receive credit. **You must complete the syllabus quiz to earn participation points.**

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.

COVID-19 CONSIDERATIONS: Because of the current conditions, all instructors and students may be required to

wear a mask in all instructional spaces (classrooms, labs, studios). Students failing to observe the mandate should be first asked by the instructor to either comply or leave the classroom; if students do not obey, instructors should be contacting public safety. Public Safety staff will be escorting students outside the instructional area and reporting them to the Office of The Dean of Students for disciplinary action. If you feel ill or in some cases, have come into contact with someone who is infected with COVID-19, do not come to class. Please contact your professor and the Office of the Dean of Students. Your professor will make reasonable accommodations and invite you into lecture via Webex if you are able.

Class Recordings: Class sessions may be recorded by the instructor. These recordings shall only be used as an educational resource and are not to be distributed or used outside of this class. Information on how to access recorded lectures will be made available by your instructor. Any recordings that contain identifiable information about students will not be used beyond this semester.

Class Recording Etiquette*:* Students are expected to respect their fellow students' privacy and freedom to learn without disruption. Students are not allowed to capture or reproduce anyone's name, image, or voice without permission. They must be polite and respectful in the online chat. Informal chat is okay, but typing is restricted to things that one would say out loud in front of the entire class. Students must always conduct themselves on their webcam video as they would in person in a classroom.

In Class Worksheets: There will be 11 in class works sheets worth 10 points each. 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**. 2-4 questions from the worksheet will be graded at random for the 10 points.** Completing the entire worksheet is highly recommended as the questions will be similar to exam questions. **Worksheets which are not completed in class may be completed by Friday.** Please upload a PDF file 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.

Synthetic Challenges: At the end of the semester, students will be divided into groups of 2 or 3. Groups will be presented with a synthetic target, starting material, and starting material restrictions and be tasked with generating an original synthetic scheme to create the target molecule. They must present their synthesis and explain what each reaction accomplishes and propose a mechanism for all reactions they incorporate in their synthesis. The score will be based on two components: the synthetic scheme and mechanism scheme. Synthetic schemes will be judged on brevity of synthetic route, selectivity, and likelihood of success of the synthesis. The mechanism will be judged on the correctness of the arrow pushing. A formal rubric will be provided at a later date.

Pre-Chapter Assignments: A short assignment in Canvas worth 3 points will be due before the beginning of each chapter. The purpose of the short assignment is to allow students to become familiar with basic topics to be covered in the lecture. Pre-chapter Assignments will be due at the beginning of lecture and will not be accepted late.

Homework Policy: 13 homework assignments worth 5 points will be presented on Aktiv Chemistry which is linked in the class Canvas page. Aktiv Chemistry will cost $28. 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 not be accepted without a valid excuse and appropriate documentation. Homework will be accepted until 11:59PM on the day they are due.

Quizzes: Quizzes are given according to the tentative date shown on the course calendar below. There will be 3 quizzes given at the beginning of lecture worth 25 pts each. Their course content coverage will be announced in lecture. Use of notes, notebooks, or textbooks will not be permitted and mobile communication devices (iPhones, mobile phones, PDAs, computers, netbooks, smart watches 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 quizzes. 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 a quiz and this will be used to confirm a student's identity during the quiz period. Quizzes will take place as scheduled and a sterile test taking environment is expected for each student. Quizzes will be timed and take place as shown on the class calendar.**

Exams: There will be 3 midterm exams during class time during the semester and 1 cumulative final exam scheduled during the final exam period. The following exam periods and course coverage are tentative and therefore subject to change:

Exam I (Ch. 1-3)	2/13
Exam II (Ch. 4-6)	3/26
Exam III (Ch. 7-12)	4/16
Final Exam (cumulative)	TBA (During finals period)

The final exam will be cumulative. Use of notes, notebooks, or textbooks will not be permitted and mobile communication devices (iPhones, mobile phones, PDAs, computers, netbooks, smart watches 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.** Exams will be returned to students as soon as possible. **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.**

In the event of online class:

In the event of online class mode being adopted, the exams will be administered online using the RESPONDUS browser with Webcam and be live proctored in a Webex meeting. **This browser is available in Canvas. Students must complete a proper environment check before starting the exam in the exam video by showing their calculator, blank scratch paper, their work surface, cell phone is placed away from work area, and a 360 degree view of their workspace to confirm no information is posted around the work area. Students may only use scientific (non-programmable, non-graphing) calculators on exams. The student will also be asked to show a photo-ID.**

During the exam from home (if needed), you have to adopt the following behaviors

1. No cell phones anywhere near the exam-- any indication of cell phone presence (a ring tone, vibration, music, will result in a point penalty)
2. No Talking to family members.
3. No Covering of face (either with clothing or hand) except for mask.
4. No Moving out of frame.
5. No Listening to music.
6. Setting up the camera so that the camera's view is not completely on student and workspace.

To protect the test's integrity, anyone found to violate any of the rules (2-6) of an exam will be docked 20 points for each violation from their exam score.

We understand these are difficult times and it is natural to move around when taking an exam in the comfort of your home. We must remind you that this is a high stakes exam and must be treated as such. Please observe all exam rules as if you were taking the exam in person.

Makeup Exam/Quiz Policy: There will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester unless a valid excuse is provided to the Dean of Students. 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.

GRADING ERROR: Assignments are returned through Canvas or in class. If you believe there is an error, you have until one week following return of the assignment to submit a piece of work for regrading. You must write a

very brief description of the problem in an email.

Cellular Phones/Smart Watches: All cellular phones and other electronic devices must be switched off during all class times unless they are being used to participate in class. Such devices must be stowed in bags 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, completing the pre-class assignment, 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, the tutoring center, office hours, library resources, and other organic textbooks/workbooks. Work on problems without the solution manual open and then check answers afterwards. **Feel free to email me or come visit during office 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.

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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: **O**ffice of **A**ccessibility **R**esources and (**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 Scott Janz, Associate Director at the

Office of Accessibility Resources and Services at 973-596-5417 or via email at scott.p.janz@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/

Using Respondus LockDown Browser and a Webcam for Online Exams

Respondus LockDown Browser is a locked browser for taking assessments or quizzes in Canvas or Moodle. It prevents you from printing, copying, going to another URL, or accessing other applications during a quiz. If a Canvas or Moodle quiz requires that LockDown Browser be used, you will not be able to take the assessment or quiz with a standard web browser. You may be required to use LockDown Browser with a webcam (Respondus Monitor), which will record you during an online exam.

The webcam can be built into your computer or can be the type that plugs in with a USB cable. Watch this short video to get a basic understanding of LockDown Browser and the webcam feature. A student Quick Start Guide (PDF) is also available.

1. Download and install LockDown Browser from this link: http://www.respondus.com/lockdown/download.php?id=264548414
2. Once your download has finished, locate the “LockDown Browser” shortcut on the desktop and double-click it. (For Mac users, launch “LockDown Browser” from the Applications folder.)
3. You will be brought to the Canvas or Moodle login page within the LockDown Browser. If you are in Moodle, click “Login with your UCID” to log in with your NJIT UCID and password and then click Login.
4. Under “My courses,” click on the course in which you have to take the exam that requires the LockDown Browser.
5. After you enter the course, find the exam and click on it.
6. A confirmation prompt will appear. Click the “Start attempt” button. Once a quiz has been started with LockDown Browser, you cannot exit until the Submit all and finish button is clicked.
7. If you are required to use a webcam (Respondus Monitor), you will be prompted to complete a Webcam Check and other Startup Sequence steps.

IST Service Desk

Students may contact the IST Service Desk with any questions. Questions or problems can be submitted via web form by going to: **https://servicedesk.njit.edu** and clicking on the "Report your issue online" link.

You may also call the IST Service Desk with any questions at 973-596-2900.

Spring 2024 Academic Calendar

January	15	Monday	Martin Luther King, Jr. Day
January	16	Tuesday	First Day of Classes
January	20	Saturday	Saturday Classes Begin
January	22	Monday	Last Day to Add/Drop a Class
January	22	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	23	Tuesday	W Grades Posted for Course Withdrawals
January	29	Monday	Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date
February	12	Monday	Last Day for 50% Refund, Full Withdrawal

March	4	Monday	Last Day for 25% Refund, Full Withdrawal
March	10	Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March	16	Saturday	Spring Recess Ends
March	29	Friday	Good Friday - No Classes Scheduled - University Closed
March	31	Sunday	Easter Sunday - No Classes Scheduled - University Closed
April	1	Monday	Last Day to Withdraw
April	30	Tuesday	Friday Classes Meet
April	30	Tuesday	Last Day of Classes
May	1	Wednesday	Reading Day 1
May	2	Thursday	Reading Day 2
May	3	Friday	Final Exams Begin
May	9	Thursday	Final Exams End
May	11	Saturday	Final Grades Due

Course Outline

Week	Tuesday
1	1/16 Lecture 1 – Ch. 1 Class Introductions Worksheet 1
2	1/23 Lecture 2 – Ch. ½ Worksheet 2 Homework 1 Due
3	1/30 Lecture 3 – Ch. 2 **Quiz 1** Worksheet 3 Homework 2 Due

4	2/6 Lecture 4 – Ch. 3 Worksheet 4 Homework 3 Due
5	2/13 Lecture 5 – Ch. 4 **Exam 1** Homework 4 Due
6	2/20 Lecture 6 - Ch. 4 Worksheet 5 Homework 5 Due
7	2/27 Lecture 7 – Ch. 5 Worksheet 6 Homework 6 Due
8	3/5 Lecture 8 – Ch. 6 **Quiz 2** Worksheet 7 Homework 7 Due
9	3/12 **NO CLASS** **SPRING RECESS**
10	3/19 Lecture 9 – Ch. 6/7 Worksheet 8 Homework 8 Due
11	3/26 Lecture 10 – Ch. 7 **Exam 2** Homework 9 Due
12	4/2 Lecture 11 – Ch. 8 Worksheet 9 Homework 10 Due
13	4/9 Lecture 12 – Ch. 13 **Quiz 3** Worksheet 10 Homework 11 Due

14	4/16 Lecture 13 – Ch. 12 **Exam 3** Homework 12 Due
15	4/23 Lecture 14 - Ch. 9 Worksheet 11 **Homework 13 Due**
16	4/30 **FRIDAY CLASSES**

COURSE OUTLINE

Lecture	Outcomes	Chapter	Topic
1-2	1,2,3,4,5	1	Review of General Chemistry, Structure and Bonding
2-3	6,7,8,11,12	2	Polarity, Acidity, and Functional groups
4	9,10,13,15	3	Structure and Stereochemistry of Alkanes
5-6	14,16,17	4	The Study of Chemical Reactions
7	13,19	5	Stereochemistry
8-9	17,18,20,21	6	Alkyl Halide, Nucleophilic Substitution and Elimination
9-10	20,22	7	Structure and Synthesis of Alkenes
11	14,23	8	Reactions of Alkenes
14	14,23	9	Alkynes
13	24,25	12	Mass Spectrometry and IR spectroscopy
12	24,25	13	NMR Spectroscopy