

Spring 2022

CHEM 243-002: Organic Chemistry I

Christopher DeSantis

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CHEM 243-002 – Organic Chemistry I

Spring 2022 Course Syllabus

The shift to remote and converged teaching due to the COVID-19 pandemic has required that both instructors and students 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.

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

COURSE INFORMATION

Course Description: This course offers students the opportunity to learn the nature of carbon in organic compounds. It presents general principles of organic chemistry related to nomenclature, structure, stereochemistry, uses and synthesis.

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: Monday: 1:00 – 2:20 PM KUPF 202
Thursday: 1:00 – 2:20 PM KUPF 202

Office Hours: IN WEBEX
Monday: 9-10:30AM
Thursday: 2:30-4PM

Also available by appointment. In-Person meetings available by appointment only.

Required material and other resources:

- 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.

University-wide Withdrawal Date: The last day to withdraw with a **W** is Monday April, 4th Last Day to Withdraw. 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. Describe properties, synthesis and reactivity of alcohols
25. Explain various organic reagents like Grignard reagents and borohydrides and their uses in specific reactions

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:

In Class Worksheets (13x)	130
Participation – CIQ (25x) + In Class Polling (25x)	50
Homework (12x + review)	75
Synthesis Challenge	50
Pre-Chapter Assignment (10x)	30
Quizzes (4x)	100
Exam I	150
Exam II	150
Final	300
Total Points	1035

A	880 > pts.	C	672 ≥ pts.
B+	828 ≥ pts.	D	569 ≥ pts.
B	776 ≥ pts.	F	569 < pts.
C+	725 ≥ pts.		

You must maintain an average of 35%, which is 245 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 25 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 (25 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 on the same day as lecture.** CIQs with incomplete or low-quality answers will not receive credit.

COVID-19 CONSIDERATIONS: Because of the current conditions, all instructors and students are 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.

In Class Worksheets: There will be 13 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. **Worksheets which are not completed in class may be completed up to 7 days after they have been presented to the class.** 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. Presentations will be made and accompanied by a formal document explaining their synthesis. During their presentation, they must provide a short presentation and include any references for reactions they find in scientific literature. They must present their synthesis to the class 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 presentation. Synthetic schemes will be judged on brevity of synthetic route, selectivity, and likelihood of success of the synthesis. The presentation will be judged on knowledge of synthetic scheme, presentation quality, and mechanism presentations. 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: 12 homework assignments worth 5 points and 1 review worth 15 points will be presented. On time homework completion is critical to success in this course. The homework due dates will be clearly posted in Canvas and discussed in class. Plan timely homework completion accordingly. Late homework will not be accepted without a valid excuse and appropriate documentation. Each student is responsible for turning in an electronic copy of their own work in the form of a PDF. Homework will be accepted until 11:59PM on the day they are due in Canvas. The homework will be released as a PDF and students will submit a picture or scan of their work on Canvas in the assignment.

Quizzes: Quizzes are given according to the tentative date shown on the course calendar below. There will be four 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 exams total in the semester held during class time during the semester. The following exam periods and course coverage are tentative and therefore subject to change:

Exam I (Ch. 1-3)	2/24
Exam II (Ch. 4-6)	3/31
Final Exam (6-11)	TBA (During finals period)

The final exam will not 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.

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 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.

Academic Integrity: *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>.

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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: Office of Accessibility Resources 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/studentssuccess/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.

Important Dates

January	17	Monday	Martin Luther King, Jr. Day
January	18	Tuesday	First Day of Classes
January	22	Saturday	Saturday Classes Begin
January	24	Monday	Last Day to Add/Drop a Class
January	24	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	25	Tuesday	W Grades Posted for Course Withdrawals
January	31	Monday	Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date
February	14	Monday	Last Day for 50% Refund, Full Withdrawal
March	7	Monday	Last Day for 25% Refund, Full Withdrawal
March	14	Monday	Spring Recess Begins - No Classes Scheduled - University Open
March	19	Saturday	Spring Recess Ends
April	4	Monday	Last Day to Withdraw
April	15	Friday	Good Friday - No Classes Scheduled - University Closed
April	17	Sunday	Easter Sunday - No Classes Scheduled - University Closed
May	3	Tuesday	Friday Classes Meet

May	3	Tuesday	Last Day of Classes
May	4	Wednesday	Reading Day 1
May	5	Thursday	Reading Day 2
May	6	Friday	Final Exams Begin
May	12	Thursday	Final Exams End
May	14	Saturday	Final Grades Due
May		TBA	Commencement

Course Outline

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	1/17 No Classes	1/18	1/19	1/20 Lecture 1 – Ch. 1 Class Introductions	1/21
2	1/24 Lecture 2 – Ch. 1 Worksheet 1	1/25	1/26	1/27 Lecture 3 – Ch. 1/2 Homework 1 Due	1/28
3	1/31 Lecture 4 – Ch. 2 Worksheet 2	2/1	2/2	2/3 Lecture 5 – Ch. 2 Homework 2 Due	2/4
4	2/7 Lecture 6 – Ch. 3 Worksheet 3	2/8	2/9	2/10 Lecture 7 – 3 Homework 3 Due Quiz 1	2/11
5	2/14 Lecture 8 – Ch. 4 Worksheet 4	2/15	2/16	2/17 Lecture 9 – Ch. 4 Homework 4 Due	2/18
6	2/21 Lecture 10 – Ch. 5 Worksheet 5	2/22	2/23	2/24 Exam 1 Homework 5 Due	2/25
7	2/28 Lecture 11 – Ch. 5 Worksheet 6	3/1	3/2	3/3 Lecture 12 – Ch. 6 Homework 6 Due	3/4
8	3/7 Lecture 13 – Ch. 6	3/8	3/9	3/10 Lecture 14 – Ch. 6	3/11

	Worksheet 7			Homework 7 Due Quiz 2	
9	3/14 Spring Break No Class	3/15 Spring Break No Class	3/16 Spring Break No Class	3/17 Spring Break No Class	3/18 Spring Break No Class
10	3/21 Lecture 15 – Ch. 7 Worksheet 8	3/22	3/23	3/24 Lecture 16 – Ch. 7 Homework 8 Due	3/25
11	3/28 Lecture 17 – Ch. 8 Worksheet 9	3/29	3/30	3/31 Exam 2 Homework 9 Due	4/1
12	4/4 Lecture 18 – Ch. 8 Worksheet 10 Last Day to Withdraw	4/5	4/6	4/7 Lecture 19 – Ch. 8 Homework 10 Due	4/8
13	4/11 Lecture 20– Ch. 9 Worksheet 11	4/12	4/13	4/14 Lecture 21 – Ch. 9 Homework 11 Due Quiz 3	4/15
14	4/18 Lecture 22 – Ch. 10 Worksheet 12	4/19	4/20	4/21 Lecture 23 – Ch.10 Homework 12 Due	4/22
15	4/25 Lecture 24 – Ch. 11 Worksheet 13	4/26	4/27	4/28 Lecture 25 – Ch. 11 Homework 13 Due Quiz 4	4/29
16	5/2 Review Synthetic Challenges Presentations	5/3 Last Day of Classes	5/4 Reading Day 1	5/5 Reading Day 2	5/6 Finals Begin
17	5/9	5/10	5/11	5/12 Finals End	5/13

COURSE OUTLINE

Lecture	Chapter	Topic
1-2	1	Review of General Chemistry, Structure and Bonding

3-4	2	Polarity, Acidity, and Functional groups
5-7	3	Structure and Stereochemistry of Alkanes
8-10	4	The Study of Chemical Reactions
12-13	5	Stereochemistry
14-16	6	Alkyl Halide, Nucleophilic Substitution and Elimination
17-18	7	Structure and Synthesis of Alkenes
19-20	8	Reactions of Alkenes
22-23	9	Alkynes
24-25	10	Structure and Synthesis of Alcohols
25-27	11	Reactions of Alcohols

*Updated by Dr. Christopher DeSantis - January, 2020
Department of Chemistry & Environmental Sciences (CES)
Course Syllabus, Spring 2022*
