NJIT New Jersey Institute of Technology

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE

CHEM 605 – Advanced Organic Chemistry, Structure and Mechanism

Fall 2025 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-Section: **CHEM 605-101**

Course Description: Structure of organic molecules and mechanisms of organic reactions. Topics include atomic and molecular structure, stereochemistry, reactive intermediates (cations, anions, radicals, and carbenes), orbital symmetry, and spectroscopy. Additional topics include chemical databases, as well as reading and writing organic chemistry articles.

Number of Credits: 3

Prerequisites: Undergraduate organic chemistry. Students that are not fully comfortable with the material of undergraduate organic chemistry will need to revisit it on their own in order to do well in this class.

Instructor: Dr. Trevor Del Castillo
Office: Tiernan Hall (TIER) 370
Email: trevor.delcastillo@njit.edu

Lectures: Thursdays, 6:00-8:50 PM, Faculty Memorial Hall (FMH) 405
Simultaneously, on Zoom. Check Canvas page (canvas.njit.edu) for links.

- For legal reasons, international students on F1/J1 visas **MUST attend class in person**, and attendance will be recorded every week for this reason.

Discussion Hours: Available by appointment. Dr. Del Castillo will be happy to meet with you at any convenient time, either in person or on Zoom. Send an email to Dr. Del Castillo to schedule a meeting.

Material: This class will involve a mixture of Powerpoint slides, in-class note taking, and worksheets. The Powerpoint slides and worksheets will be posted ahead of class on the Canvas page for the course.

Textbooks: Material for this class is from one main textbook. It isn't required but is recommended:

Title	Intermediate Organic Chemistry
Authors	Ann M. Fabirkiewicz, John C. Stowell
Edition	3rd edition
Publisher	Wiley
ISBN #	978-1-118-30881-3

Molecular Model Kit: Students are encouraged to purchase a molecular model kit. Such a kit will also be allowed during the exams.

LEARNING OUTCOMES

After completing this course, students will be able to:

- Find information on compounds, reactions and authors in the chemical databases;
- Identify the key scientific journals in the field of organic chemistry and use their websites;
- Actively read and critique research articles by identifying important features, learning about precedents and analyzing the data presented.
- Discuss research results in a written and oral format;
- Relate the molecular structure to orbital arrangement, stability and reactivity;
- Distinguish between the various types of stereoisomers and conformations;
- Propose experimental techniques for the study of specific reaction mechanisms
- Propose plausible reaction mechanisms based on experimental data, using the curved-arrow formalism.
- Use molecular orbital theory to describe sigma and pi bonds, conjugated, or aromatic systems
- Describe the mechanisms of reactions happening to conjugated and aromatic systems;
- Describe the mechanisms of substitution reactions such as the S_N1 and S_N2 reactions;
- Estimate the stability and reactivity of various cationic, anionic and radical intermediates;
- Describe the mechanisms of addition and elimination reactions;
- Describe the mechanisms involved in the addition or substitution reactions of carbonyl compounds;

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.

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 resources and/or 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:

Biweekly forum participation	15%
Literature presentation	15%
Problem sets	25%
Midterm exam	20%
Final exam	25%

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%		

Participation: As this is a graduate course, class participation is expected. Students are expected to join class on time. Students are also expected to arrive prepared through reading on the material before the lecture, and to ask and answer questions during class.

Biweekly forum participation: Every two weeks, the instructor will post a discussion topic regarding the course material on the Canvas page. Each student is expected to:

1) Make a detailed post about the discussion topic, within the first week after discussion is opened;

2) Engage with the other students' posts by answering their questions and/or making constructive comments, within two weeks after the discussion was assigned.

The instructor will assess the thoughtfulness and effort deployed by each student to determine their grade. Each student's post will count toward 60% of the forum grade, and interaction with others 40%. In total, forum participation will be worth 15% of the final grade.

Literature presentation: Reading research papers, searching the literature, and presenting results are key skills in organic chemistry. You will be asked to present a 10-minute presentation detailing a proposed synthesis of an organic molecule based on literature precedent that you have found and cited. Detailed assignment information will be provided during the semester. Both the preparation and the presentation itself will be graded, for a total of 15% of the final grade. The presentations will take place in-person on November 25th (Tuesday), December 4th, and December 11th. All students must be available and attend in person those three dates.

Problem sets: Problem sets will be assigned during the semester, approximately one every two weeks. Problem set answers will need to be submitted on paper (no electronic submissions allowed). Students must turn in their own answers to the problems, written legibly or prepared using an appropriate software. Students are responsible for the legibility of the work they turn in. Overall the problem sets will be worth a total of 25% of the final grade.

Exam: There will be two exams. Exams will happen in-person only, in the regular classroom. The midterm exam, worth 20% of the final grade, is tentatively scheduled for the October 23rd meeting date and will last only 90 minutes. The final exam will be scheduled in the final week of the semester and is worth 25%. The date will be confirmed later.

Attendance Policy: Except when Powerpoint slides will be used, the notes will not be provided. If students don't attend the lectures, they will not have access to the material covered. Exceptions can be made if the absence is excused by the Dean of Students.

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 Dr. Del Castillo that the exam will be missed, in advance, 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.

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/

Important Dates:
See the Fall 2025 Academic Calendar: https://www.njit.edu/registrar/fall-2025-academic-calendar

Date	Day	Event
September 1	M	Labor Day
September 2	T	First Day of Classes
September 8	M	Last Day to Add/Drop a Class Last Day for 100% Refund, Full or Partial Withdrawal
September 9	T	W Grades Posted for Course Withdrawals
October 2	R	Wellness Day
November 10	M	Last Day to Withdraw
November 25	T	Thursday Classes Meet
November 26	W	Friday Classes Meet
November 27	R	Thanksgiving Recess Begins
November 30	Su	Thanksgiving Recess Ends
December 11	R	Last Day of Classes
December 12	F	Reading Day
December 14 -20	Su - S	Final Exams
December 22	M	Final Grades Due

COURSE OUTLINE

Date	Topic	Pre-lecture reading	Assignments and due dates
Sept. 4th	Syllabus Organic chemistry general review Chapter 1: Chemical Databases and the Literature	Chap. 2	
Sept. 11th	Chapter 2: Stereochemistry	Chap. 3	
Sept. 18th	Chapter 3: Study and description of organic reaction mechanisms	Chap. 4	Problem set #1 due
Sept. 25th	Chapter 3: Study and description of organic reaction mechanisms		
Oct. 2nd	Wellness Day – no class		
Oct. 9th	Chapter 4: Conjugation, aromaticity and pericyclic reactions		Problem set #2 due
Oct. 16th	Chapter 4: Conjugation, aromaticity and pericyclic reactions	Chap. 5	
Oct. 23rd	Midterm exam (90 minutes) **IN-PERSON REQUIRED** Chapter 4: Conjugation, aromaticity and pericyclic reactions		
Oct. 30th	Chapter 5: Substitution reactions		
Nov. 6th	Chapter 5: Substitution reactions		Problem set #3 due
Nov. 13th	Chapter 6: Addition and elimination reactions		
Nov. 20th	Chapter 6: Addition and elimination reactions		Problem set #4 due
Nov. 25th (Tuesday)	Oral presentations **IN-PERSON REQUIRED**		
Dec. 4th	Oral presentations **IN-PERSON REQUIRED**		
Dec. 11th	Oral presentations **IN-PERSON REQUIRED** Review		Problem set #5 due
Dec. 14-20	Final exam (date to be confirmed) **IN-PERSON REQUIRED**		