

Fall 2023

## **CHEM 605-101: Advanced Organic Chemistry**

Pier Alexandre Champagne

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## CHEM 605 – Advanced Organic Chemistry, Structure and Mechanism

### *Fall 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:** 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. Pier Alexandre Champagne  
Office: Tiernan Hall (TIER) 354  
Email: pier.a.champagne@njit.edu

**Lectures:** Thursdays, 6:00-9:00 PM, Faculty Memorial Hall (FMH) 305  
Simultaneously, on Webex. 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.

**Office Hours:** Tuesdays, 5-6 PM  
Wednesdays, 5-6 PM  
You can meet Dr. Champagne for questions/discussion during the office hours listed above. Dr. Champagne will always be available at those times, in his office.  
If you are not available at these scheduled times, Dr. Champagne will be happy to meet at another time, either in person or on Webex. Send an email to Dr. Champagne to schedule your appointment.

**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 two main textbooks. None are required but they are recommended:

<b>Title</b>	Intermediate Organic Chemistry	Advanced Organic Chemistry, Part A: Structure and Mechanisms
<b>Authors</b>	Ann M. Fabirkiewicz, John C. Stowell	Francis A. Carey, Richard J. Sundberg
<b>Edition</b>	3 <sup>rd</sup> edition	5 <sup>th</sup> edition
<b>Publisher</b>	Wiley	Springer
<b>ISBN #</b>	978-1-118-30881-3	978-0387448978

**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 and computational 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<sub>N</sub>1 and S<sub>N</sub>2 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](mailto:dos@njit.edu)

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

<b>Biweekly forum participation</b>	10%
<b>Literature presentation</b>	15%
<b>Problem sets</b>	30%
<b>Midterm exam</b>	20%
<b>Final exam</b>	25%

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

<b>A</b>	100-90%	<b>C</b>	74-70%
<b>B+</b>	89-85%	<b>D</b>	69-65%
<b>B</b>	84-80%	<b>F</b>	Below 65%
<b>C+</b>	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 10% of the final grade.

Questions about the course material or assignments should be posted on the forum as well, so that all students can benefit from the answers. The instructor will visit the discussion board regularly to answer questions and comment on discussions.

**Literature presentation:** Reading research papers and presenting results are key skills in organic chemistry. You will be asked to present a 10-minute presentation about one organic chemistry papers of your choice that was published in 2022 or 2023. 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 grade. The presentations will take place in-person on November 21<sup>st</sup> (Tuesday), November 30<sup>th</sup>, and December 8<sup>th</sup>. 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 30% 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 19th meeting data 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.

**Email Policy:** All email communication should be done using the "njit.edu" domain. No chemistry questions will be answered through email. Office hours or the Canvas forum should be used for questions.

**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. Champagne 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. 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](mailto: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 the Fall 2023 Academic Calendar: <https://www.njit.edu/registrar/fall-2023-academic-calendar>

Date	Day	Event
September 4	M	Labor Day
September 5	T	First Day of Classes
September 11	M	Last Day to Add/Drop a Class Last Day for 100% Refund, Full or Partial Withdrawal
September 12	T	W Grades Posted for Course Withdrawals
November 13	M	Last Day to Withdraw
November 21	T	Thursday Classes Meet
November 22	W	Friday Classes Meet
November 23	R	Thanksgiving Recess Begins
November 26	Su	Thanksgiving Recess Ends
December 13	W	Last Day of Classes
December 14-15	R - F	Reading Days
December 17 -23	Su - S	Final Exams
December 24	Su	Final Grades Due

# COURSE OUTLINE

Date	Topic	Pre-lecture reading	Assignments and due dates
Sept. 7 <sup>th</sup>	Syllabus Organic chemistry general review Chapter 1: Chemical Databases and the Literature	IOC Chap. 2	
Sept. 14 <sup>th</sup>	Chapter 2: Stereochemistry	IOC Chap. 3	
Sept. 21 <sup>st</sup>	Chapter 3: Study and description of organic reaction mechanisms	IOC Chap. 4	Problem set #1 due
Sept. 28 <sup>th</sup>	Chapter 3: Study and description of organic reaction mechanisms		
Oct. 5 <sup>th</sup>	Chapter 4: Conjugation, aromaticity and pericyclic reactions		Problem set #2 due
Oct. 12 <sup>th</sup>	Chapter 4: Conjugation, aromaticity and pericyclic reactions	IOC Chap. 5	
Oct. 19 <sup>th</sup>	Midterm exam (90 minutes) Chapter 4: Conjugation, aromaticity and pericyclic reactions		
Oct. 26 <sup>th</sup>	Chapter 5: Substitution reactions	AOC Chap. 4	
Nov. 2 <sup>nd</sup>	Chapter 5: Substitution reactions		Problem set #3 due
Nov. 9 <sup>th</sup>	Chapter 6: Addition and elimination reactions	AOC Chap. 5	
Nov. 16 <sup>th</sup>	Chapter 6: Addition and elimination reactions		Problem set #4 due
Nov. 21 <sup>st</sup> (Tuesday)	Oral presentations		
Nov. 30 <sup>th</sup>	Oral presentations		
Dec. 7 <sup>th</sup>	Oral presentations Review		Problem set #5 due
Dec. 21 <sup>st</sup>	Final exam (date to be confirmed)		

IOC: Intermediate Organic Chemistry, by Fabirkiewicz and Stowell  
AOC: Advanced Organic Chemistry, by Carey and Sundberg

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

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