

**Advanced Organic Chemistry
Chemistry 511
Spring 2020**

Tuesday 6:00-8:50 PM, Smith 240

Instructor:

Prof. Stacey Brenner-Moyer (<http://www.brennermoyer.com/>)

Contact Information: seb244@newark.rutgers.edu

Please note that I cannot answer "chemistry questions" (i.e., Can you please explain the mechanism in homework problem #3?) over e-mail.

Office Hours: Tuesdays 5:00-6:00 PM in Room 201E Life Sciences Building.

Course Description:

This course will introduce the first principles of organic chemistry. For students planning to continue studying organic chemistry, this course will provide the foundation for rationalizing and predicting advanced organic reaction mechanisms. For students planning to study other areas of chemistry, this course will provide insight into the relevance of methods used in other fields of chemistry to organic chemistry, as well as into the rational design of experiments to test scientific hypotheses.

Learning Goals:

Upon completion of the course, students should be able to:

- Predict relative thermodynamic, kinetic, and stereochemical outcomes of selected reactions.
- Interpret thermodynamic, kinetic, and stereochemical data to draw reasonable conclusions with respect to reaction mechanisms.
- Illustrate the mechanism of selected reactions.

Required Texts and Materials:

1. Carey, Francis A.; Sundberg, Richard J. *Advanced Organic Chemistry, Part A: Structure and Mechanism*. 5th ed. Springer, 2007.

NOTE: This entire book can be downloaded for FREE from campus or login via Rutgers account: <http://dx.doi.org.proxy.libraries.rutgers.edu/10.1007/978-0-387-44899-2>

Recommended Materials:

1. Molecular Model Set for Organic Chemistry, Prentice Hall

Course Evaluation:

Your grade for the course will be determined as follows:

Take Home Exam: 25%

Presentation: 35%

Final Exam: 40%

Take Home Exam: The assigned homework problems for Chapter 3 will serve as a take home exam. The assigned problems for Chapter 3 should be handed in one week after the lecture on Chapter 3, at the beginning of class on February 18. Prof. Brenner-Moyer will randomly select a maximum of 6 out of the 12 assigned homework problems to grade.

Presentation: Each student will prepare a 15-minute power point lecture a pre-assigned topic from chapter 9 (Electrophilic aromatic substitution), 4 (Nucleophilic substitution), or 5 (Electrophilic addition to C-C multiple bonds). Each student will present his/her power point lecture to the class during the scheduled lecture date for the chapter, on either March 10, 24, or 31. Thoroughness of material covered, accuracy of information conveyed, and quality of oral presentation will factor heavily into the grading of the presentation.

Topics to be assigned for presentations:

Chapter 4: Nucleophilic substitution

- SN1, SN2, and borderline mechanisms
- Carbocations, carbocation rearrangements
- Nucleophilicity, solvent effects
- Stereochemistry, neighboring group participation
- Leaving group effects, steric and strain effects, non-classical carbocations

Chapter 5: Electrophilic addition to C-C multiple bonds, and elimination

- Addition of HX, H₂O
- Addition of halogens, oxymercuration
- Addition to alkynes and allenes
- E2/E1/E1cb mechanisms
- Regiochemistry (i.e., orientation) and stereochemistry in elimination reactions

Chapter 9: Electrophilic aromatic substitution

- Electrophilic aromatic substitution generic mechanism, substitution of groups other than H
- Structure-reactivity relationships
- Nitration, halogenation, coupling with diazonium
- Friedel-Crafts alkylation and acylation, polycyclic and heteroaromatic compounds
- Nucleophilic aromatic substitution

Final Exam: Exam questions will be derived from lecture notes and homework assignments.

Policy for Absence from Exams or Illness During Exams: If absent on February 18, scan and e-mail take home exam to Prof. Brenner-Moyer. In the event of an excused absence on the scheduled date of the presentation, the presentation will be given the following week. In the event of an absence that is not deemed by Prof. Brenner-Moyer to be excused, a grade of "0" will be recorded for the presentation. In the event of an excused absence from the final exam, contact Professor Brenner-Moyer as soon as possible. In the event of an absence that is not deemed by Professor Brenner-Moyer to be excused, a grade of "0" will be recorded for the final exam.

Issues of Courtesy: Lecture will start as scheduled, at 6:00 PM. Please try to arrive on time, with your cell phone, pager, and/or other electronic devices turned off. If you must arrive late to lecture, please enter quietly, so as not to disrupt those who were on time and are listening intently.

Please note: There will be a 15 minute break during every lecture.

Assigned Problems:

Ch. 1: 1a, 2a,d, 4, 5, 8, 9, 11, 12c, 15, 16, 17, 19

Ch. 2: 1, 5, 6, 7, 8, 10, 12, 14, 16, 23a, 26c,d,f,h,l, 30

Ch. 3: 1b, 3, 5, 6, 7b, 8, 10, 12, 13, 19, 20, 23

Ch. 4: 2b,d,f, 3, 8, 9, 11, 13a,e, 14, 16, 20, 21, 23, 26
Ch. 5: 1, 4, 6, 8, 12, 13, 14, 15, 17, 19
Ch. 6: 2, 3, 7, 8, 9, 10, 13, 15, 16, 18b, 24
Ch. 7: 1, 2b,c, 9, 10c,e, 11, 15, 17, 20, 21, 24, 25, 26
Ch. 8: 2, 4, 7, 8, 10, 11, 13, 14, 15, 18
Ch. 9: 1, 2, 3, 4, 6, 8, 11, 14, 15, 17, 19a, c
Ch. 10: 1, 2a,b,c, 4, 6, 7c,d,f,g, 10, 12, 13, 14b,d,e, 15, 17, 18, 21
Ch. 11: 3, 4, 5, 8, 9, 13, 17, 18, 19, 20
Ch. 12: 2b,3b,4a-e,8,13,17,19,21

Tentative Schedule of Course Topics, Exams and Reading Assignments:

<u>Week</u>	<u>Date</u>	<u>Topic</u>	<u>Reading</u>
1	Tues. Jan. 21	Chemical Bonding and Molecular Structure	1.1 – 1.2
2	Tues. Jan. 28	Stereochemistry, Conformation, and Stereoselectivity	2.1
3	Tues. Feb. 4	Stereochemistry, Conformation, and Stereoselectivity	2.2-2.3
4	Tues. Feb. 11	Structural Effects on Stability and Reactivity	Chapter 3
5*	Tues. Feb. 18	Carbanions and Other Carbon Nucleophiles	6.1, 6.3-6.5
6	Tues. Feb. 25	Addition, Condensation and Substitution Reactions of Carbonyl Compounds	7.1 – 7.2
7	Tues. Mar. 3	Aromaticity	8.1 – 8.3
8**	Tues. Mar. 10	Aromatic Substitution	9.1 – 9.5
9**	Tues. Mar. 24	Nucleophilic Substitution	Chapter 4
10**	Tues. Mar. 31	Polar Addition and Elimination Reactions	5.1 – 5.3, 5.6, 5.9- 5.10
11	Tues. Apr. 7	Concerted Pericyclic Reactions	10.1 – 10.6
12	Tues. Apr. 21	Free Radical Reactions	11.1 – 11.6
13	Tues. Apr. 28	Photochemistry	Chapter 12
14	Tues. May 12	FINAL EXAM (ALL CHAPTERS)	

Important Dates:

* Homework problems for Chapter 3 to be handed in at the beginning of lecture

** Student presentations

Academic Integrity: As an academic community dedicated to the creation, dissemination, and application of knowledge, Rutgers University is committed to fostering an intellectual and ethical environment based on the principles of academic integrity. Academic integrity is essential to the success of the University's educational and research missions, and violations of academic integrity constitute serious offenses against the entire academic community. The entire Academic Integrity Policy can be found here: <http://academicintegrity.rutgers.edu/academic-integrity-policy/>

Accommodations and Support: Rutgers University Newark (RU-N) is committed to the creation of an inclusive and safe learning environment for all students. RU-N has identified the following resources to further the mission of access and support:

- **Students with Disabilities:** Rutgers University welcomes students with disabilities into all of the University's educational programs. The Office of Disability Services (ODS) is responsible for the determination of appropriate accommodations for students who encounter barriers due to disability. In order to receive consideration for reasonable accommodations, a student with a disability must contact ODS, register, have an initial appointment, and provide documentation. Once a student has completed the ODS process (registration, initial appointment, and documentation submitted) and reasonable accommodations are determined to be necessary and appropriate, a Letter of Accommodation (LOA) will be provided to the student. The student must give the LOA to each course instructor, followed by a discussion with the instructor. This should be completed as early in the semester as possible as accommodations are not retroactive. More information can be found at ods.rutgers.edu. Contact ODS: (973) 353-5375 or ods@newark.rutgers.edu.
- **Religious Holiday Policy and Accommodations:** Students are advised to provide timely notification to instructors about necessary absences for religious observances and are responsible for making up the work or exams according to an agreed-upon schedule. The Division of Student Affairs is available to verify absences for religious observance, as needed: (973) 353-5063 or DeanofStudents@newark.rutgers.edu.
- **Counseling Services:** Counseling Center Room 101, Blumenthal Hall, (973) 353-5805 or <http://counseling.newark.rutgers.edu/>.
- **Students with Temporary Conditions/Injuries:** Students experiencing a temporary condition or injury that is adversely affecting their ability to fully participate in their courses should submit a request for assistance at: <https://temporaryconditions.rutgers.edu>.
- **Students Who are Pregnant:** The Office of Title IX and ADA Compliance is available to assist students with any concerns or potential accommodations related to pregnancy: (973) 353-1906 or TitleIX@newark.rutgers.edu.
- **Gender or Sex-Based Discrimination or Harassment:** Students experiencing any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, should know that help and support are available. To report an incident, contact the Office of Title IX and ADA Compliance: (973) 353-1906 or TitleIX@newark.rutgers.edu. To submit an incident report: tinyurl.com/RUNReportingForm. To speak with a staff member who is confidential and does **NOT** have a reporting responsibility, contact the Office for Violence Prevention and Victim Assistance: (973) 353-1918 or run.vpva@rutgers.edu.