

Chemistry 504: Organic Reaction Mechanisms
Fall 2019, Rutgers University, Newark
Syllabus
Lecture: Wednesday, 6:00-8:50 PM, Smith Hall, 240

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Office hours: By appointment.

Course Synopsis:

This course will cover fundamental aspects of writing mechanisms for organic reactions. Basic principles and reaction types will be reviewed with a focus on mechanistic understanding and synthetic applications. The course is aimed to serve as a bridge between undergraduate and graduate curriculum.

Required Text:

- *Strategic Applications of Named Reactions in Organic Synthesis*. Kurti, L.; Czako, B.

Recommended Texts (Optional):

General organic chemistry textbooks

- *The Art of Writing Reasonable Organic Reaction Mechanisms*, Grossman, R. B.
- *Advanced Organic Chemistry, Part B: Reactions and Synthesis*. Carey, F. A.; Sundberg, R. J.

General heterocyclic and organometallic organic chemistry textbooks

- *Organotransition Metal Chemistry: From Bonding to Catalysis*. Hartwig, J.
- *Heterocyclic Chemistry, 5th Ed.* Joule, J. A.; Mills, K.

Useful Websites:

- <https://www.name-reaction.com/list>
- <https://www.organic-chemistry.org/namedreactions/>

Prerequisites: Introductory level undergraduate organic chemistry I and II

Grading:

Two exams will count for 50% of the course grade, and a comprehensive final exam will count for the other 50% of the course grade. To avoid any need for make-up exams, the score on the final exam can be used to replace the lowest score of the midterm exams (or an exam missed for any reason). Letter grades will be assigned according to the following scale (scores are percentages of the maximum possible points): A (100-85), B+ (84-80), B (70-79), C+ (69-65), C (64-55), D (54-45), F (44-0).

Breakdown:

Midterm I: 25%

Midterm II: 25%

Final Exam: 50%

Approximate Class Outline:

Week	Date	Lecture	Topic
1	Sep 4	Lecture 1	General reactivity 1
2	Sep 11	Lecture 2	General reactivity 2
3	Sep 18	Lecture 3	Rearrangements
4	Sep 25	Lecture 4	Electrophilic aromatic substitution
5	Oct 2	Lecture 5	Electrophilic addition to C-C multiple bonds
6	Oct 9	Lecture 6	Carbocycle formation
7	Oct 16	Lecture 7	Midterm 1
8	Oct 23	Lecture 8	Homologation and epoxidation
9	Oct 30	Lecture 9	Nucleophilic substitution and pericyclic reactions
10	Nov 6	Lecture 10	Heterocycle formation 1
11	Nov 13	Lecture 11	Heterocycle formation 2
12	Nov 20	Lecture 12	Midterm 2
13	Nov 27	Lecture 13	Thanksgiving Break
14	Dec 4	Lecture 14	Transition-metal-catalyzed cross-coupling 1
15	Dec 11	Lecture 15	Transition-metal-catalyzed cross-coupling 2
Finals	Dec 18		Final Exam

Exam:

Exam will be closed book, closed note. Exam will cover lecture material, assigned reading and literature discussed in class.

Class Outline:

Each student will be required to draw mechanisms on the blackboard on a rotating basis during the class. The goal is to learn the key points during the class session by applying the basic mechanisms (left-hand side in Kurti/Czako book) to the real-life examples (right-hand side in Kurti/Czako book). The mechanisms during the class are not graded; however, **each student is required to complete 80% of his/her rotation to pass the class.**

Learning Objectives:

After completion of this course students should:

- be familiar with fundamental aspects of writing mechanisms for organic reactions
- be familiar with major classes of organic reactions with a focus on mechanistic understanding and synthetic applications
- be able to predict reactivity of different classes of compounds
- be familiar with drawing reasonable mechanisms in organic chemistry
- be able to recognize basic chemistry of functional groups

- be familiar with different types of organic reactions
- be able to develop an approach to drawing mechanisms of common and new organic reactions
- be able to plan synthetic routes to simple organic molecules containing common motifs
- be familiar with general synthetic approaches used in organic chemistry

Attendance Policy:

Please, review Rutgers University attendance policy, which can be found at <http://policies.rutgers.edu/view-policies/academic-%E2%80%93-section-10#2>

Academic Integrity Policy:

Please, review Rutgers University Academic Integrity Policy, which can be found at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. This policy applies to all Schools and Colleges of Rutgers, the State University of New Jersey, including the Ernest Mario School of Pharmacy and the Rutgers College of Nursing.