Chemistry 26:160:564: Organic Reactions & Mechanisms
Fall 2023, Rutgers University, Newark
Syllabus
Lecture: Wednesday, 6:00-8:50 PM, Smith Hall, 240

Professor Michal Szostak, LSC II 219
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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.

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:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Sep 6</td>
<td>Lecture 1</td>
<td>General reactivity 1</td>
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<tr>
<td>2</td>
<td>Sep 13</td>
<td>Lecture 2</td>
<td>General reactivity 2</td>
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<tr>
<td>3</td>
<td>Sep 20</td>
<td>Lecture 3</td>
<td>General reactivity 3</td>
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<tr>
<td>4</td>
<td>Sep 27</td>
<td>Lecture 4</td>
<td>General reactivity 4</td>
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<tr>
<td>5</td>
<td>Oct 4</td>
<td>Lecture 5</td>
<td>Acylation reactions and nucleophilic substitution</td>
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<td>6</td>
<td>Oct 11</td>
<td>Lecture 6</td>
<td>Rearrangements</td>
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<tr>
<td>7</td>
<td>Oct 18</td>
<td>Lecture 7</td>
<td>Midterm 1</td>
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<tr>
<td>8</td>
<td>Oct 25</td>
<td>Lecture 8</td>
<td>Homologation and epoxidation</td>
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<tr>
<td>9</td>
<td>Nov 1</td>
<td>Lecture 9</td>
<td>Electrophilic addition to C-C multiple bonds</td>
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<td>10</td>
<td>Nov 8</td>
<td>Lecture 10</td>
<td>Carbocycle formation</td>
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<td>11</td>
<td>Nov 15</td>
<td>Lecture 11</td>
<td>Electrophilic aromatic substitution</td>
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<td>12</td>
<td>Nov 22</td>
<td>Lecture 12</td>
<td>Friday Classes</td>
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<td>13</td>
<td>Nov 29</td>
<td>Lecture 13</td>
<td>Midterm 2</td>
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<tr>
<td>13</td>
<td>Dec 6</td>
<td>Lecture 14</td>
<td>Heterocycle formation</td>
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<td>14</td>
<td>Dec 13</td>
<td>Lecture 15</td>
<td>Transition-metal-catalyzed cross-coupling</td>
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<tr>
<td>Finals</td>
<td>Dec 20</td>
<td>Lecture 15</td>
<td>Final Exam</td>
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**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 each class session by applying basic mechanisms (left-hand side in the Kurti/Czako book) to the real-life examples (right-hand side in the Kurti/Czako book). The mechanisms during the class are not graded; however, **each student is required to complete 80% of their 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

Add/Drop/Withdraw:

• Add/Drop period: September 5 - September 14
• Last day to drop with a "W": October 30
• Full Calendar (NCAS is school 21): https://registrar.newark.rutgers.edu/office-registrar-fall-academic-calendar

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.

Academic Calendar: https://myrun.newark.rutgers.edu/f23

Final Exam Schedule: https://scheduling.newark.rutgers.edu/ru-n-final-exam-schedule-fall-2022/

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: https://academicintegrity.rutgers.edu/sites/default/files/pdfs/current.pdf

Accommodation and Support:

Your health and well-being matter, and Rutgers has put in place a number of resources that are intended to help students through the challenges that might emerge during these times. Information on many of these resources appears below. Please let us know immediately if you are experiencing circumstances that are negatively impacting your academic performance. We also strongly encourage you to contact your academic advisor.
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:

- **Absences:** All students are responsible for timely notification of their instructor regarding any expected absences. The Division of Student Affairs can provide assistance for absences related to religious observance, emergency or unavoidable conflict (illness, personal or family emergency, etc.) Students should refer to the University’s Course Attendance policy (10.2.7) at [https://policies.rutgers.edu/sites/default/files/10.2.7%20-%20current.pdf](https://policies.rutgers.edu/sites/default/files/10.2.7%20-%20current.pdf), for complete expectations and responsibilities. The office can be contacted at: (973) 353-5063 or deanofstudents@newark.rutgers.edu.

- **Disabilities:** The Office of Disability Services (ODS) is responsible for the determination of appropriate accommodations for students who encounter barriers due to disability. Once a student has completed the ODS process (registration, initial appointment, and submitted documentation) and reasonable accommodations are determined to be necessary and appropriate, a Letter of Accommodation (LOA) will be provided. The LOA must be given to each course instructor by the student and follow up with a discussion. 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.

- **Temporary Conditions/Injuries:** The Division of Student Affairs can assist students who are experiencing a temporary condition of injury (broken or sprained limbs, concussions, or recovery from surgery). Students experiencing a temporary condition or injury should submit a request for assistance at: [https://temporaryconditions.rutgers.edu](https://temporaryconditions.rutgers.edu).

- **Pregnancy:** The Office of Title IX and ADA Compliance is available to assist students with any concerns or potential accommodations related to pregnancy. Students may contact the office at (973) 353-1906 or TitleIX@newark.rutgers.edu.

- **Gender or Sex-Based Discrimination or Harassment:** The Office of Title IX and ADA Compliance can assist students experiencing any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking. Students can report an incident to the office at: (973) 353-1906 or TitleIX@newark.rutgers.edu. Incidents may also be reported by using the following link: tinyurl.com/RUNReportingForm. For more information, students should refer to the University’s Student Policy Prohibiting Sexual Harassment, Sexual Violence, Relationship Violence, Stalking and Related Misconduct located at: [https://uec.rutgers.edu/policies/title-ix/](https://uec.rutgers.edu/policies/title-ix/).

- **Interpersonal Violence:** The Office for Violence Prevention and Victim Assistance can provide any student with confidential support. The office is a confidential resource and does not have a reporting obligation to report information to the University’s Title IX Coordinator. Students can contact the office at: (973) 353-1918 or run.vpva@rutgers.edu. There is also a confidential, text-based line students can text for support: (973) 339-0734.

- **Crisis and Concerns:** The Campus Awareness Response and Education (CARE) Team works with students in crisis to develop a support plan to address personal situations that might
impact academic performance. Students may contact the CARE Team at: http://tinyurl.com/RUNCARE or careteam@rutgers.edu.

· **Stress, Worry, or Concerns about Well-Being:** The Counseling Center [https://studentaffairs.newark.rutgers.edu/health-wellness/counseling-center](https://studentaffairs.newark.rutgers.edu/health-wellness/counseling-center) has confidential therapists available to support students. To schedule an appointment: counseling@newark.rutgers.edu or (973) 353-5805. If a student is not quite ready to make an appointment with a therapist but is interested in self-help, check out [https://studentaffairs.newark.rutgers.edu/health-wellness/counseling-center/sanvello-app](https://studentaffairs.newark.rutgers.edu/health-wellness/counseling-center/sanvello-app).

· **Emergencies:** Call 911 or contact Rutgers University Police Department (RUPD) at (973) 353-5111.

**Learning Resources:**

· **Rutgers Learning Center (tutoring services)**  
  (973) 353-5608  
  [https://sasn.rutgers.edu/student-support/tutoring-academic-support/learning-center](https://sasn.rutgers.edu/student-support/tutoring-academic-support/learning-center)

· **Writing Center (tutoring and writing workshops)**  
  (973) 353-5847  
  nwc@rutgers.edu  
  [https://sasn.rutgers.edu/student-support/tutoring-academic-support/writing-center](https://sasn.rutgers.edu/student-support/tutoring-academic-support/writing-center)