

Organic Chemistry 223 - Fall 2016

Zachary Osner, PhD
 Flanner Hall 200A, Loyola University
 zosner@luc.edu

Lecture M/W/F 10:25 – 11:15 a.m. Life Science Building-142 (Sect 001)

Discussion Fri 11:30 a.m. – 12:20 p.m. Dumbach Hall 125 (Sect 002)
 Fri 12:35 p.m. – 1:25 p.m. Dumbach Hall 125 (Sect 003)
 Fri 1:40 p.m. – 2:30 p.m. Dumbach Hall 125 (Sec 004)

Office Hours Wed: 4:00 p.m. – 5:30 p.m. & Thur: 1:30 p.m. – 3:00 p.m.

Required Text: L.G. Wade, Jr., "Organic Chemistry" 8th Ed. hard copy or eText

Required Key: J.W. Simek, "Solutions Manual Organic Chem.", 8th Ed.

Recommended: Your favorite molecular modeling kit. Here are some options. (\$ not guaranteed)

- Darling \$18.65 in LUC Bookstore with cardboard box; \$15 in stockroom
- Darling \$36.00 in LUC Bookstore with green plastic box
- Prentice Hall Molecular Model Set for Organic \$35.33 (colorful & pretty)
- Prentice-Hall Framework Molecular Models (Brumlik) \$45.80 (tubes to cut)
- HGS Fundamental Organic Set \$17.00

Extra help:

Pushing Electrons by Daniel Weeks

The Organic Chemistry Answer by Matthew J. Hamiel

Do you have an interest in human health, prescription medicines and drugs? Organic chemistry is utilized by medicinal organic chemists for the design and construction of new molecules that are prescribed by doctors and dispensed by pharmacists to treat diseases. Organic chemistry is also the essential science for inventing new soaps and detergents, dyes, plastics, and resins, and it is also used in creating certain types of new photoreceptors for renewable solar energy.

1.Content-specific Objectives: Topics will include: nomenclature, structures, properties, reactions, mechanisms and synthesis of alkanes, alkyl halides, alkenes, alkynes, alcohols and ethers; study of molecular structure, geometry, and properties; functional groups; reactive organic species; stereochemistry; spectroscopy; spectrometry.

The student should learn how to:

1. Identify the various classes of organic compounds, their methods of preparation, and typical reactions.
2. Name and draw specific organic compounds.
3. Postulate a *logical* reaction mechanism for simple organic reactions.
4. Discriminate amongst relative stabilities of reaction intermediates.
5. Plan and write out multi-step syntheses using known functional group transformations.
6. Prepare for basic identification/purification/separation techniques of organic compounds required in the lab.
7. Analyze and interpret data from instruments used in separating and identifying compounds: IR, NMR, MS.

2. *IDEA Objectives*: These objectives include learning outcomes beyond this course and will apply across multiple courses and disciplines as you develop as an independent learner at Loyola. These have been selected by the faculty to apply to all sections of Organic Chemistry:

1. Gaining factual knowledge (terminology, classifications, methods, trends)
2. Learning fundamental principles, generalizations, or theories
3. Learning to *apply* course material (to improve thinking, problem solving, and decisions)
4. Learning how to find and use resources for answering questions or solving problems
5. Learning to *analyze* and *critically evaluate* ideas, arguments, and points of view

3. *Exam Dates (subject to change)*:

| | |
|-------------------------------|------------------------------------|
| Friday, September 23, 2016: | Mid-term Exam 1 |
| Monday, October 31, 2016: | Mid-term Exam 2 |
| Wednesday, November 30, 2016: | Mid-term Exam 3 |
| Monday, December 12, 2016: | Final Exam, 9:00-11:00 a.m. |

4. *Quiz Dates (subject to change)*:

| | |
|------------------------------|---------------|
| Wednesday, September 7, 2016 | Quiz 1 |
| Friday, September 30, 2016 | Quiz 2 |
| Wednesday, October 12, 2016 | Quiz 3 |
| Monday, October 24, 2016 | Quiz 4 |
| Friday, November 11, 2016 | Quiz 5 |
| Monday, November 21, 2016 | Quiz 6 |

5. *Quizzes, Exams, and Grading*:

A total of six 20-minute quizzes will be given at the end of the lecture section. Each quiz will consist of 5 free response questions for a total of 20 points per quiz. The lowest of your four quiz grades will be dropped. If you miss a quiz, that is the quiz that will be dropped. **No make-up quizzes will be given under any circumstances.**

There are three cumulative 50-minute mid-term exams and one cumulative 2-hour final exam. The three mid-term exams will be administered at the beginning of the class. The lowest of the three mid-term exams will be dropped. If you miss an hourly exam, that is the exam that will be dropped. **No make-up mid-term exams will be given under any circumstances.** The final exam is cumulative and cannot be dropped.

| | | |
|---------------|-------------------|--|
| Discussion | 20 points | |
| Quiz | 20 points | (Best five out of six quizzes) |
| Quiz | 20 points | |
| Quiz | 20 points | |
| Quiz | 20 points | |
| Quiz | 20 points | |
| Mid-term exam | 100 points | (Best two out of three mid-term exams) |
| Mid-term exam | 100 points | |
| Final Exam | 150 points | |
| TOTAL | 470 points | |

You must bring a form of photo identification, such as your Loyola Student ID or your driver's license, with you to the exam. During exams, you will be required to leave your books, backpacks, notebooks, etc. at the front of the room. All exams are closed book and closed notes. For each exam, you are allowed a reaction crib sheet. This crib sheet will consist of an 8.5 × 11" sheet of paper (both sides!) with general examples of reactants, reagents, and products. The crib sheet must be handwritten (no photocopying) and CANNOT include: stereochemistry, definitions, or mechanisms. The reaction crib sheets will be collected with every exam and returned with the graded exams. When you are finished with your exam, please bring your completed exam to the front, and leave the room quietly without disturbing the other students.

Exams will be graded and returned to you as quickly as possible. All grading questions, points of clarification, and grading errors must be brought to the instructor's attentions during office hours no later than one week after return of the exam.

The grading scale used to determine letter grades are as follows: **A** 100 – 93, **A-** 92 – 87, **B+** 86 – 83, **B** 82 – 77, **B-** 76 – 70, **C+** 69 – 60, **C** 59 – 50, **C-** 49 – 45, **D** 44 – 40, **F** < 40.

Students wanting to drop lecture after midterm may stay in the co-req lab only if midterm grade, posted in LOCUS, is a D or better. Students should continue to attend lecture until the week of the drop date to gain as much background knowledge as possible. For Fall 2016 students wishing to drop lecture, and have a midterm grade of D or better, can seek assistance from the Department of Chemistry and Biochemistry office beginning Monday 10/31 at 9:00am through Friday 11/4 at 4:00pm. Students with a midterm grade of F must drop the co-req lab along with the lecture. No exceptions.

6. *Homework:* Organic chemistry is a new language that is spoken in words and in structures. The best way to learn a language is to work some problems every day. Homework problems will be assigned for each chapter, but will not be collected. You must work problems in a timely manner. Past experience has shown that exam success is a direct result of working the problems in the book.

7. *Norms of Course Proceedings:* The classroom is to be a safe place to question and explore ideas. Student and teacher voices are important to this work. Collegial disagreement can be a healthy part of this process, but must always include respect for all members of the class.

Course activities will be designed to help students reach the goal of learning chemistry content and developing critical thinking skills. This will more often be driven by the use of data and reasoning to discover concepts and solutions rather than the identification and exchange of chemical facts and algorithms.

Students are expected to read individually on their own time outside of class.

Class sessions will begin and end on time. All students should attend class regularly and participate in class discussions. Absences could affect one's ability to learn chemistry during this session. Anticipated absences should be discussed with the instructor two class days before the absence. Proper documents may be requested to verify the reason for any absence. No make-up exams or quizzes will be granted for any absence during an exam or quiz day, **no matter what the excuse.**

8. *Discussion:* The discussion section will be devoted to working on discussion hand-outs and answering questions regarding homework problems. At the beginning of the semester, students will be paired off into permanent discussion groups of two. At the beginning of every discussion class, a worksheet with questions relevant to the topics covered in class will be handed out. Discussion groups will then have an opportunity to explain to the class their answer for a question, and earn 4 participation points. The answer to the question does not have to be the correct answer to earn the participation points. A total of 20 participation points can be earned throughout the semester.

9. *Sakai Materials*: Handouts given in class will be mirrored on Sakai.

10. *Academic Honesty*: All students in this course are expected to have read and abide by the demanding standard of personal honesty, drafted by the College of Arts & Sciences, that can be viewed at:

http://www.luc.edu/cas/pdfs/CAS_Academic_Integrity_Statement_December_07.pdf

Anything that you submit that is incorporated as part of your grade in this course (*e.g.* quiz, examination, homework, lab report) must represent your own work. Any students caught cheating will, at the very minimum, receive a grade of “zero” for the exam that was submitted and this grade cannot be dropped. If the cheating occurred during a course exam, the incident will be reported to the Chemistry Department Chair and the Office of the CAS Dean. Depending on the seriousness of the incident, additional sanctions may be imposed.

11. *Strategies and Suggestions*:

- The best method of learning organic chemistry is to work the assigned problems and write out the answers. *Then* check your answers versus the Answer Key.
- Study at least 10 hours per week and maintain a steady pace of studying. Organic chemistry continually builds, like a language, so studying some every day is most effective.
- Skim the current chapter before the corresponding lecture, so that you will be aware of the topics to be covered.

12. *Practices for Success*: Supporting claims with evidence, making applications, solving and analyzing problems, and using chemical principles to explain phenomena are critical skills in the field of chemistry. The development of these skills is not without some frustration, but it carries the reward of deepening one’s ability to think critically and solve problems in any field. The use of targeted, guiding questions, regularly scheduled work, and strategic study plans can greatly assist the learning of chemistry. With such a focus, hopefully any frustration will quickly turn to appreciation and fascination for the relevance and connectedness of chemistry in your life and within the world around you. Solving and analyzing problems is the most important feature of this work. If, at any time, you need assistance framing such plans for your work in chemistry, please do not hesitate to ask the instructor.

13. *Tutoring*: The tutoring Center at the university offers free tutoring to students. To see the complete tutoring schedule and find additional information, visit the Tutoring Center webpage at www.luc.edu/tutoring

14. *Office Hours*: My office door will be open per the times listed. Please use this time to if you have extra questions regarding this course. If you are unavailable to meet at the listed times, please feel free to email me with any questions. However, if you email me at night (after 6:00 p.m.), on weekends, or during holiday breaks I will respond to your email within 12 hours. I will only reply to emails sent from Loyola email accounts. Please include your class and section number in the email subject line.

15. *Students with Disabilities Policy*: Eligibility for services is determined on an individual basis based on documented need. Self-disclosure and the submission of documentation can be initiated anytime during the year. However, reasonable time must be allowed before the student can expect accommodations to be in place. Self-disclosure and documentation are required only if students plan to request accommodations. Students should provide information and documentation at a reasonably early date to allow time for the development and arrangement of appropriate accommodations. In some cases, several weeks’ advance arrangement is needed. Accommodations cannot be retroactive. Accommodations begin only after documentation is received and reasonable time for accommodation development has been allowed.

<http://www.luc.edu/sswd/index.shtml>

16. *Harassment (Bias Reporting)*: It is unacceptable and a violation of university policy to harass, discriminate against or abuse any person because of his or her race, color, national origin, gender, sexual

orientation, disability, religion, age or any other characteristic protected by applicable law. Such behavior threatens to destroy the environment of tolerance and mutual respect that must prevail for this university to fulfill its educational and health care mission. For this reason, every incident of harassment, discrimination or abuse undermines the aspirations and attacks the ideals of our community. The university qualifies these incidents as incidents of bias.

In order to uphold our mission of being Chicago's Jesuit Catholic University-- a diverse community seeking God in all things and working to expand knowledge in the service of humanity through learning, justice and faith, any incident(s) of bias must be reported and appropriately addressed. Therefore, the Bias Response (BR) Team was created to assist members of the Loyola University Chicago community in bringing incidents of bias to the attention of the university. If you believe you are subject to such bias, you should notify the Bias Response Team at this link: <http://webapps.luc.edu/biasreporting/>

Organic Chemistry 223 Tentative Lecture Schedule (subject to change)

| | | |
|-------|-----|---|
| 8-29 | 1 | Lewis Structures & Bonding |
| 8-31 | 1 | Lewis Structures & Bonding |
| 9-2 | 2 | Structure & Properties of Organic Molecules |
| 9-5 | -- | <i>Labor Day</i> |
| 9-7 | 2 | Structure & Properties of Organic Molecules/ Quiz 1 |
| 9-9 | 2 | Structure & Properties of Organic Molecules |
| 9-12 | 3 | Structure & Stereochemistry of Alkanes |
| 9-14 | 3 | Structure & Stereochemistry of Alkanes |
| 9-16 | 3/4 | Structure & Stereochemistry of Alkanes/Reactions & Mechanism: Free radical halogenation |
| 9-19 | 4 | Reactions & Mechanism: Free radical halogenation |
| 9-21 | 4 | Reactions & Mechanism: Free radical halogenation |
| 9-23 | -- | EXAM I (Chapters 1-4 or as announced) |
| 9-26 | 5 | Stereochemistry |
| 9-28 | 5 | Stereochemistry |
| 9-30 | 5 | Stereochemistry/ Quiz 2 |
| 10-3 | 6 | Alkyl Halides: S _N 1, S _N 2, E1, E2 |
| 10-5 | 6 | Alkyl Halides: S _N 1, S _N 2, E1, E2 |
| 10-7 | 6 | Alkyl Halides: S _N 1, S _N 2, E1, E2 |
| 10-10 | -- | <i>Fall Break</i> |
| 10-12 | 6 | Alkyl Halides: S _N 1, S _N 2, E1, E2/ Quiz 3 |
| 10-14 | 7 | Alkenes: structure and synthesis |
| 10-17 | 7 | Alkenes: structure and synthesis |
| 10-19 | 7 | Alkenes: structure and synthesis |
| 10-21 | 7 | Alkenes: structure and synthesis |
| 10-24 | 8a | Alkenes: reactions/ Quiz 4 |
| 10-26 | 8a | Alkenes: reactions |
| 10-28 | 8a | Alkenes: reactions |
| 10-31 | -- | EXAM II (Chapters 5-8a or as announced, cumulative) |
| 11-2 | 8b | Alkenes: reactions |
| 11-4 | 8b | Alkenes: reactions |
| 11-7 | 9 | Alkynes |
| 11-9 | 9 | Alkynes |
| 11-11 | 10 | Alcohols: structure and synthesis/ Quiz 5 |
| 11-14 | 10 | Alcohols: structure and synthesis |

| | | |
|-------|----|--|
| 11-16 | 10 | Alcohols: structure and synthesis |
| 11-18 | 11 | Alcohols: reactions |
| 11-21 | 11 | Alcohols: reactions/ Quiz 6 |
| 11-23 | -- | <i>Thanksgiving Break</i> |
| 11-25 | -- | <i>Thanksgiving Break</i> |
| 11-28 | 11 | Alcohols: reactions |
| 11-30 | -- | EXAM III (Chapters 8b-11or as announced, cumulative) |
| 12-2 | 12 | IR and MS |
| 12-5 | 12 | IR and MS |
| 12-7 | 13 | NMR |
| 12-9 | 13 | NMR |
| 12-12 | -- | Cumulative Final Exam, Life Science Building-142 Monday, December 12, 9:00-11:00 a.m. |

Ch Assigned Problems

- 1-11, 14-20, 23, 25, 27, 29, 31, 34-37, 40-46
- 1-11, 13-29, 32-42, 44
- 1-7, 9-12, 14-18, 20-21, 24-25, 27-35, 37-40, 44, 46
- 1-15, 18-19, 21-26, 28-44, 46-50
- 1-3, 5-10, 14-21, 23, 25-31
- 1-7, 9-12, 14-27, 29-30, 32-53, 55-56, 66
- 1-2, 4-6, 8-17, 20-25, 27-47
- 1-13, 15, 17-30, 32-38, 44-47, 48a-e, 49-51, 61
- 1-2, 4-9, 12-34
- 1-4, 6-10, 12-20, 22-27, 29-33, 35-42, 49
- 1-3, 5-6, 9-15, 19, 21-22, 24-26, 30-34, 36-37, 39-46, 48, 53
- 2-9, 11-12, 14-20, 23-25
- 2-11, 13-16, 18-20, 21b, 22-26, 29-44, 47-49
- TBD....