

**Organic Chemistry 224 - Summer 2017**

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Lecture Tu/We/Th 8:30 – 11:10 a.m. Cuneo Hall Room 312 (Sect 003)

Office Hours Tue: 3:00 p.m. – 5:00 p.m.; Wed 3:00 p.m. – 5:00 p.m.

*Required Text:* L.G. Wade, Jr., "Organic Chemistry" 8<sup>th</sup> Ed. ISBN 978-0-321-59231-6

*Required Key:* J.W. Simek, "Solutions Manual Organic Chem.", 8<sup>th</sup> Ed. ISBN 978-0-321-77389-1

*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. *Course Content & Objectives:* Second semester of a two semester sequence for non-chemistry majors. Mastery of the second semester material requires comprehensive understanding and recall of the first semester material. Organic chemistry of conjugated  $\pi$  systems, aromatics, carbonyl compounds, amines, carboxylic acids and their derivatives, carbohydrates, lipids and proteins. 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 organic reactions.
4. discriminate among relative stabilities of reaction intermediates.
5. plan and write out multi-step syntheses using known functional group transformations, including syntheses of polyfunctional organic compounds.
6. name, draw and interpret the 2- and 3-dimensional structures of important biopolymers, and techniques for their synthesis and characterization.
7. analyze and interpret data from various instruments used in separating and identifying organic compounds including: IR, NMR, UV-vis and MS.

2. *IDEA Objectives:*

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
6. 5 extra credit points will be awarded to the entire class if there is a 95% class response to the end of the semester IDEA survey

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

Tuesday, July 11, 2017:	<b>Quiz 1</b>
Thursday, July 20, 2017:	<b>Quiz 2</b>
Tuesday, August 1, 2017:	<b>Quiz 3</b>
Wednesday, August 9, 2017:	<b>Quiz 4</b>

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

Tuesday, July 18, 2017:	<b>Mid-term Exam 1</b>
Wednesday, July 26, 2017:	<b>Mid-term Exam 2</b>
Thursday, August 3, 2017:	<b>Mid-term Exam 3</b>
Thursday, August 10, 2017:	<b>Final Exam, 9:00-11:00 a.m.</b>

5. *Quizzes, Exams, and Grading:*

A total of four 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 (this includes CHEM 223) 2-hour final exam. The three mid-term exams will be administered at the beginning of the class, followed by a short break. Discussion and lecture will resume after the exams for the rest of the class time. 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 (this includes any material covered in CHEM 223) and cannot be dropped.

Quiz	20 points	(Best three out of four quizzes)
Quiz	20 points	
Quiz	20 points	
Mid-term exam	100 points	(Best two out of three mid-term exams)
Mid-term exam	100 points	
<u>Final Exam</u>	<u>150 points</u>	
TOTAL	410 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.

I generally grade on a curve based on the average and the standard deviation. I will give statistics including the mean, the median, and the standard deviation for each exam. I do not predict cutoffs.

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.

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 will be granted for any absence during an exam day, no matter what the excuse

Class will start with a 50 minute lecture followed by a 10 minute break. The second portion of the class will start with a 30 minute discussion during which sample problems will be worked and students will be allowed to ask questions and participate in group discussions regarding the course material being covered. Another 10 minute break will be granted after this discussion session. The final 60 minutes of class will be used for lecture.

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

9. *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](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.

10. *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.

11. *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.

12. *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.

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](http://www.luc.edu/tutoring)

14. *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>

15. *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 224 Tentative Lecture Schedule (subject to change)**

7-4	--	<i>Fourth of July</i>
7-5	12/13	IR and MS review/ <sup>1</sup> H and <sup>13</sup> C NMR review
7-6	14	Ethers, epoxides, and sulfides
7-11	15	<b>QUIZ I</b> /Conjugated Systems, Orbital Symmetry, UV
7-12	15	Conjugated Systems, Orbital Symmetry, UV
7-13	16	Aromatic Compounds
7-18	16	<b>EXAM I (Chapters 12-15 or as announced, cumulative)</b> /Aromatic Compounds
7-19	17	Reactions of Aromatic Compounds
7-20	17/18	Reactions of Aromatic Compounds/ Ketones & Aldehydes/ <b>QUIZ 2</b>
7-25	18	Ketones & Aldehydes
7-26	19	<b>EXAM II (Chapters 16-18 or as announced, cumulative)</b> /Amines
7-27	19	Amines
8-1	20	Carboxylic Acids/ <b>QUIZ 3</b>
8-2	21	Carboxylic Acid Derivatives
8-3	21	<b>EXAM III (Chapters 19-20 or as announced, cumulative)</b> /Carboxylic Acid Der
8-8	22	$\alpha$ -Substitution, Condensations of Enols & Enolates
8-9	23	Carbohydrates and Nucleic Acids/ <b>Quiz 4</b>
8-10	--	<b>FINAL EXAM 9:00-11:00 a.m. (cumulative, this includes CHEM 223 material)</b>

**Ch Assigned Problems for Wade 8<sup>th</sup> Edition**

12. 2-12, 14-20, 22-29
13. 2-27, 29-44, 46-49
14. 1-23, 25-39, 41-44, 46-47
15. 1-27, 30-33
16. 1-22, 24-28, 30, 32-36, 38-39, 41-42, 46-47
17. 2, 4-26, 29-30, 32-56, 68
18. 1-13, 15-21, 23-32, 34-49, 51-52, 55-57, 60, 62-67
19. 1-21, 23-33, 35-45, 47-51, 53, 55-56, 58
20. 1-12, 14-21, 23-27, 29-41, 44-46
21. 1-10, 12-14, 16-20, 22, 24-32, 34-41, 43-48a-f, 49-54, 61-62, 64-65
22. 1-24, 26, 28-40a-c, 42-48a, 51, 53, 55-65, 67-71, 73-74
23. 1-5, 7-12, 14, 16-19, 21-24, 26-31, 33-36, 39-40, 42-46, 48-56, 59, 61-63
24. 1-11, 13-18, 20, 22-23, 25, 27, 30, 32-39, 41, 48