

CHEMISTRY 008B WINTER 2023 - SYLLABUS

LECTURE INSTRUCTOR: Professor Richard J. Hooley

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LECTURE: MWF 10:00 am - 10.50 am, Materials Science & Engineering 104 (MSE 104).

Prerequisites: CHEM 008A with a grade of "C-" or better.

Final Exam: Tuesday, March 21st, 08:00 a.m. - 11:00 a.m., MSE 104

OFFICE HOURS: Chemical Sciences 442, **Tuesdays 3:30 - 5 pm; Wednesdays 1 - 2 pm.**

Review Sessions: Chemical Sciences 231, **Wednesdays 6.00 pm; Jan 18th, Feb 1st, Feb 15th, Mar 1st, Mar 15th.**

Pre-exam Reviews: Chemical Sciences 231, **Saturdays, 1.00 pm; Feb 4th, Mar 4th.**

Enrollment Coordinator: Dr. Rena Hayashi, Science Laboratories I. Phone 827-3143. **All questions on scheduling, adding/dropping, and lab should be directed to Dr. Hayashi.**

Canvas/eLearn: <https://elearnhome.ucr.edu>. The Chem 008B eLearn site will hold all necessary course information, including practice exams, notices, documents, and grades. It will be upgraded regularly.

PollEverywhere: We will use PollEverywhere to in class, to let me know how well you're picking up the material. These questions are NOT graded, but hopefully will help your understanding. Please make an account before class starts, if you don't already have one. (<https://teaching.ucr.edu/pollev>).

Details: Respond at **PollEv.com/richardhoole540**, or Text **RICHARDHOOLE540** to **37607** to join.

Required Textbooks and Materials:

Solomons, Fryhle and Snyder, "*Organic Chemistry*," 12th ed., Wiley.

Solomons, Fryhle and Snyder, "*Organic Chemistry, 12e Study Guide / Solutions Manual*," 12th ed., Wiley.

Molecular Models (Darling Organic Chemistry Models, or whichever you are most comfortable with).

Grading:

Exams: There will be two midterm exams and a final exam.

Exam I (In Class, Monday Feb 6th).

Exam II (In Class, Monday Mar 6th).

Final Exam (Tuesday, March 21st, 08:00 a.m. - 11:00 a.m., MSE 104- as posted in **Schedule of Classes**)

Exams I and II are worth 100 points each.

The Final Exam is cumulative, and is worth 200 points.

- **YOU MUST TAKE THE FINAL EXAM AT THE POSTED TIME!** If you miss this exam, you will receive an "Incomplete," and must re-take the exam during the next offering of 008B (next winter or summer – not a good idea!).

Note about grading: the exams are written so that the average score for the class will be approximately 50/100. This ensures the broadest distribution of results and the fairest curve. The class scores will be tabulated, and your grade assigned **based on your ranking in the class**. You will be informed of the projected grade breakdowns after each exam. The average grade for this class is **usually** a B-, and I have a limit of ~15% A grades (including +/-). Your numerical scores in the midterms will probably be lower than you're used to – this does not mean you don't know the material, just that the exams are designed to give the fairest method of assigning grades. Do not worry about your numerical scores, just your grades. If the average is 50/100, a score of 75/100 will be excellent.

Grade Redemption Policy The Final is the most important exam in this course, so as an incentive, we have a grade redemption policy. If you get 2 grade steps higher in the Final than in your overall grade, I will use your Final grade as the grade you get for the whole class. So if you get a B on the Final, but a C+ overall, you get a B. This doesn't apply if you get one step higher (i.e. C+ on the Final, C overall), as that breaks the grade scale. **Note that your grade CANNOT go down, only up!**

You must take BOTH midterms (or have an excused absence) to be considered for grade redemption.

Examinations: There will be no make-up examinations. If you miss a midterm due to emergency or illness (doctor's note required), your grade on the Final will be substituted for your midterm grade. There are no exceptions. There will be assigned seating for every exam. **A photo identification (CA driver's license or Student ID) will be required to take the examinations.** Anyone caught cheating in the lecture or the laboratory will automatically fail the course, and will be recommended for dismissal from the University. See also *Course/Exam Content and Study Habits*, below.

Course/Exam Content and Study Habits: It is essential that you keep-up with the reading, review lecture notes, and understand the solutions to all assigned problems. Homework will not be graded, but **it is unlikely you will pass this course without working all assigned problems.**

Classroom Conduct: The goals of this course can only be accomplished in a setting of mutual respect. All students are welcomed and encouraged to actively participate in the learning of chemistry, regardless of race, gender, social class, religious beliefs, previous academic experience, etc. I will strive to always treat every student with respect, and I expect you to do the same. Please let me know if there is anything I can do to ensure that everyone is encouraged to succeed in this class, and speak to me immediately if you feel you are experiencing a hostile environment. Laptops, tablets, cell phones, and other devices are not to be used during lectures, unless you speak with me about a specific need.

Improper Behavior: Any form of improper behavior during lecture or on examinations will not be tolerated. Improper behavior includes (but is not limited to) cheating (including bringing unauthorized materials into an exam), class disruption, submitting another person's work as your own, sabotaging or otherwise interfering with another student's work. A student engaged in improper behavior is subject to immediate dismissal from the course with a failing grade.

Outside the Classroom: College comes with many challenges, and while some can be taken in stride, others are best faced with the support of others. If you experience anything that compromises your safety and/or well-being on this campus, we urge you to seek support. The campus has many resources available for help on a variety of issues, such as: medical emergencies, counseling and psychological needs, harassment, discrimination, hate crimes, stalking, hazing, sexual misconduct, and civil rights violations. If you have been a victim of or were a witness to something that could be categorized as one of the things listed above, we encourage you to seek help as soon as you feel able to do so, ***EVEN IF YOU ARE NOT SURE IT QUALIFIES.*** You can come to one of us or you can go directly to one of the other resources available on campus — whatever makes you feel comfortable and safe. Faculty members are mandated reporters on some topics (such as sexual assault) and not others, but we will maintain confidence insofar as we are able. A few important resources are listed below:

Campus Safety Escort Service: (951) 827-3722

UCR Police Department: (951) 827-5222

Title IX Coordinators: (951) 827-7070 <https://titleix.ucr.edu/>

Campus CARE Advocate: (951) 827-6225 <https://care.ucr.edu/>

Counseling & Psychological Services: (951) 827-5531 <https://counseling.ucr.edu/>

Learning Outcomes

At the end of this course, you should be able to:

- Understand the how to determine molecular structure from spectroscopic analysis.
- Understand how different types of Nuclear Magnetic Resonance experiments can be used to determine molecular structure and properties.
- Understand the effects of conjugation on reactivity, including some pericyclic reactions.
- Understand aromaticity and Hückel theory.
- Understand the unique reactivity of aromatic molecules.
- Understand the reactivity of carbonyl species, alcohols and alkyl halides.
- Use arrow-pushing mechanisms to understand multi-step reactions.
- Plan and analyze multistep synthetic routes to complex organic molecules.

Approximate Schedule of Lectures: The chapters and sections listed below represent a *best estimate* of the sequence of the course. We will cover Chapters 9, 11 - 17 in this class. ***Note that some chapters are shorter than the others.***

The book is a reference guide - all the information you need for the exams comes from the lectures and videos. As chapters 11 and 12 lead directly into chapter 16, we will vary the order a bit.

Jan 9, 11, 13, 18	Chapter 9	Mass spectrometry, NMR Spectroscopy, Structural Analysis.
Jan 20, 23, 25	Chapter 13	UV Spectroscopy, Conjugated Dienes, Diels-Alder.
Jan 27, 30	Chapter 14	Benzene structure, aromaticity, aromatic NMR.
Feb 6	EXAM I	Chapters 9, 13, 14, first half of 15.
Feb 1, 3, 8, 10	Chapter 15	Reactions of aromatic compounds.
Feb 13, 15, 17	Chapter 11	Reactions of alcohols, ethers and epoxides.
Feb 22, 24	Chapter 12	Oxidation of alcohols, organometallic addition to carbonyls.
Feb 27, Mar 1, 3, 8	Chapter 16	Addition reactions to aldehydes and ketones.
Mar 6	EXAM II	Chapters 11, 12, 15, first half of 16.
Mar 10	Interlude	Recap and Review/Problem Solving + Synthesis.
Mar 13, 15, 17	Chapter 17	Properties and reactions of carboxylic acids and derivatives.
Mar 21	FINAL EXAM	Chapters 9, 11 - 17.

Class Notes: We will post class notes from lecture once a week, in case you missed anything. You shouldn't treat this as an excuse to skip class, though - we cover a lot of material and do a lot of topics in depth. Lectures are the best place to get the information you need...

Video Modules: To allow class time for group-based active learning and problem solving, I have filmed five 15 minute video segments on the introductory, fundamental aspects of some chapters. There are segments covering topics from Chapters 9 (NMR - coupling), 13 (the Diels-Alder Reaction), 15 (Aromatic Reactivity), 16 (Acetal Mechanism) and a video on Synthesis. They are posted on Yuja/eLearn, and ***are required viewing.***

Active Learning Modules: We will have active learning modules during the class - the exact form of these will vary, and may include clickers, group problem solving sessions, etc. ***They will not be graded,*** but they are designed to help you learn the material, so please participate!

Review Sessions: Five evening review sessions will be scheduled (***Wednesdays 6.00 pm; Jan 18th, Feb 1st, Feb 15th, Mar 1st, Mar 15th***), and we will have two pre-exam review sessions on ***Saturdays, 1.00 pm; Feb 4th, Mar 4th***. These sessions will incorporate review of recent material, and questions/answers. No new material will be covered, but these sessions are the best time to learn how to answer exam questions. Make sure to bring your own questions!

Problem Sets: There will be seven problem sets posted on iLearn throughout the quarter. These are not graded; an answer key will be posted a week after the problem sets. It is in your interest to do these problem sets before the key is posted. We can discuss the answers at office hours and review sessions. These problem sets are similar to the types of questions on the exams, more so than the questions from the book.

Mock Exams: Practice midterms (and answer keys) will be posted approx. 1 week before each test. Topic summaries will be posted after each topic is concluded (generally one per chapter).

Book Questions (Solomons, Fryhle and Snyder, 12th): There is a lot of posted material in this class, and hopefully seven (long) problem sets and five mock exams will be sufficient for you to grasp the material. If you need more practice, the questions in Solomons are quite good for learning the basics of the material and should be done throughout the quarter, in time with the lectures. There are multiple levels of questions, such as "starter" questions (those throughout the chapters), which should be used to get you comfortable with the basics – do these questions first. The end-of-chapter problems are more complex.

The problem set questions and mock exam questions will give you the best idea of your exam questions: you will NEVER get a multiple choice question on one of my exams.

Preparing for exams is a process that starts on the first day of class - don't miss a lecture, and keep up with the reading. Work all the problems and ask questions if you have trouble.