

CHEMISTRY 008A FALL 2023 - SYLLABUS

LECTURE INSTRUCTOR: Professor Richard J. Hooley

HEAD TA: Olivia Taylor (otayl004@ucr.edu)

OFFICE: 444 Chemical Sciences

TELEPHONE: I prefer e-mail!

E-MAIL: richard.hooley@ucr.edu

LECTURE: MWF 9:00 am - 9.50 am, Materials Science & Engineering 104 (MSE 104)

Prerequisites: CHEM 001C with a grade of "C-" or better.

Final Exam: Thursday, December 14, 8:00 a.m. - 11:00 a.m., MSE 104

OFFICE HOURS: Chemical Sciences 442/444, **Tuesdays 4 pm - 5 pm, Wednesdays 12 - 2 pm.**

Review Sessions: Chemical Science Building 231, **6 pm - 8 pm, Wednesdays Oct 11th, Oct 25th, Nov 8th, Dec 6th.**

Pre-exam Reviews: Chemical Science Building 231, **1 pm - 3 pm, Saturday Oct 28th, *second review tbd – probably on Monday Nov 27th.***

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

PollEverywhere: We will use PollEverywhere 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/polley>).

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. Molecular Models (Darling Organic Chemistry Models).

Grading: Your grade will be determined from exams and in-class active learning modules.

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

Exam I (In Class, Monday Oct 30th)

Exam II (In Class, Wednesday Nov 29th).

Final Exam (Thursday, December 14, 8:00 a.m. - 11:00 a.m., MSE 104, see ***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 008A (next winter or summer – not a good idea!).

Graded Active Learning Modules: 25 points total, 5 pts each. We will take your top 5 scores (out of 6), so you have a one module "buffer" that will be discounted.

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.

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 will automatically fail the course. 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.**

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

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 structure, conformations and molecular motions of organic molecules.
- Draw organic molecules and use those structures to understand the 3D structure of the

molecules.

- Understand the role of acidic and basic groups in organic reactivity.
- Use arrow-pushing formalisms to describe resonance and ionic stability.
- Understand the various forms of isomerism, and how these isomers vary in 3D structure.
- Understand the thermodynamic and kinetic basis behind organic chemical reactions.
- Use arrow-pushing mechanisms to understand multi-step reactions of alkenes.
- Understand and predict reactivity and structural changes upon substitution and elimination reactions.
- Understand the basics behind multi-step organic synthesis.

Approximate Schedule of Lectures: The chapters and sections listed below represent a best *estimate* of the sequence of the course. We will cover Chapters 1 - 8 and 10 in this class. Chapter 9 will be covered at the start of Chem 008B.

The book is a reference guide - all the information you need for the exams comes from the lectures and videos.

| | | |
|--------------------|----------------|---|
| Sept 28, Oct 2 | Chapter 1 | Bonding, Resonance |
| Oct 4, 6 | Chapter 2 | Functional Groups, Intermolecular Forces, IR Spectroscopy |
| Oct 9, 11 | Chapter 3 | Acid-Base Chemistry |
| Oct 13, 16, 18 | Chapter 4 | Alkanes and Cycloalkanes: Structure and Conformation |
| Oct 20, 23, 25, 27 | Chapter 5 | Stereochemistry |
| Oct 30 | EXAM I | Chapters 1-5 |
| Nov 1, 3, 6, 8, 13 | Chapter 8 | Reaction overview, Cations and Alkene Reactivity |
| Nov 15, 17, 20, 22 | Chapter 6 | Substitution Reactions: S _N 1 and S _N 2 |
| Nov 29 | EXAM II | Chapters 6, 8 |
| Nov 27, Dec 1, 4 | Chapter 7 | Alkynes, Elimination Reactions and Alkene Structure |
| Dec 6, 8 | Chapter 10 | Alkyl Halides and Radical Reactions |
| Dec 14 | | FINAL EXAM Chapters 1 - 8, 10 |

Class Notes: As we vary from the book a bit, 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...

Active Learning Modules: Six *graded* active learning modules will be scheduled (*in class, 9.25am-9.50am, tentatively scheduled for Oct 9th, Oct 20th, Oct 27th, Nov 8th, Nov 20th, Dec 6th*). These active learning modules will consist of 3-4 questions each that are to be answered in class. You will be allowed (encouraged!) to answer these questions in groups, with the help of myself, TAs and SI leaders. You will each hand in your answers, however, and we will grade them. ***If you attend these sessions and pay attention in class, you should get all 25 points for these modules.*** They are essentially "free points" to help your learning - make sure you attend! ***NOTE - the exact dates of the modules may vary, depending on how fast we move through the course.***

Pre-Class 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 1/2 (resonance), 4 (isomers and stereochemistry), 5 (general reactivity), 6 (nucleophilic substitution), 8 (alkene reactions). They are posted on Canvas, and ***they are required viewing for the class. The material will not be covered twice, and will be tested on the exams, so make sure you watch them!***

Review Sessions: Four evening review sessions will be scheduled (***Wednesdays 6.00-8.00pm, Chemical Sciences 231, Oct 11th, Oct 25th, Nov 8th, Dec 6th***), and we will have two pre-exam review sessions on ***Saturday Oct 28th*** and a date tbd, *probably Monday Nov 27th*. I will probably

organize one more in the middle of November (Thanksgiving is early, so is disrupting the schedule a bit) – I'll let you know. These sessions will incorporate review of recent material, and question and answer sessions. 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 nine problem sets posted on Canvas throughout the quarter (approx. 1/week). 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.**

Mock Exams: Practice (mock) midterms (and detailed answer keys) will be posted approximately 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 nine (long) problem sets and four 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 of the problems and ask questions if you have trouble.