

Syllabus

Chem 2410 & Chem 2411, Spring 2024

Organic Chemistry I

Course Description:

None of the individual concepts in organic chemistry are hard, but there are a lot of them...

Understanding basic organic chemistry is critical to many professions and to many societal issues. Organic Chemistry at Penn is also fast-paced and challenging. In addition, this may be the first course you have ever taken that is not straightforward. *Regular study habits are essential* so that you can integrate the different concepts into a useful problem-solving framework. I am here to help, I have limited my travel for this semester. So please, don't be shy about asking for help when you need it!

It is helpful to approach this class like a foreign language. At first you learn the letters and how to pronounce them (for us molecules and their properties), then you learn words (for us reactions), and then you string them together into sentences (for us reaction sequences). Just as with a foreign language, this is most readily learned by *daily practice*. Similarly, it is extremely easy to get behind in this class, and once behind it is virtually impossible to catch up. Penn students are really smart and many of you have been highly effective with strategies different from this is in other past courses, but they are not likely to work here.

One reason medical schools and other institutions value this course is that it will show how disciplined you are. We are here to help with this daily practice and opportunities will be available every day to have your questions answered – please take advantage of them! *My primary goal is to help every one of you to grow and achieve your full potential to become a stronger thinker capable of taking on hard problems.* This is another reason many institutions value the course – it is often the first time you have to answer complex questions by *extrapolating* concepts using pattern recognition and logic (much like patient diagnosis).

Organic Chemistry I (Chem 2410/2411) is the first semester in a two semester sequence introducing organic chemistry. It is the prerequisite for Organic Chemistry II (Chem 2420/2421).

- Typically taken in the second year and beyond
- Not intended as an entry-level chemistry course
- Requires integration of a large amount of information into a conceptual framework
- This framework and pattern recognition are used to accomplish higher-order problem solving
- Topics: structure; bonding; acid-base chemistry; organic reaction mechanism; thermodynamics vs kinetics; the reactions of alkanes, alkyl halides, alkenes, alkynes, and alcohols
- Skills developed: self-discipline, self-assessment, information retention/integration, organization of conceptual frameworks, complex problem solving/extrapolation, pattern recognition

Pre-requisites and Co-requisites: General Chemistry I and II (Chem 1012/1022) are prerequisites for this course.

•Chem 2410 is Organic Chemistry I without lab. **This course is not suitable for pre-health students.** You may not take the lab separately later. The *only* reasons to take this course are:

- 1) you have major which requires Organic Chemistry I but does not require lab AND you are NOT a prehealth student
- 2) you are taking Organic Chemistry I as a general interest course (elective) AND you are NOT a prehealth student

•Chem 2411 is Organic Chemistry I with lab. Organic Chemistry Lab I (Chem 2412) is a **co-requisite** for Chem 2411. If you need to drop Chem 2411, then you must also drop the lab. Both Chem 2411 and Organic Chemistry Lab I (2412) must be taken before Chem 2421.

Instructors: Professor Marisa C. Kozlowski (she,her,hers) , IAST 4002, marisa@sas.upenn.edu

TAs and LAs: TBA

Mental Health Resources:

The Chemistry Department is here to support you! At Penn Chemistry, we care about the holistic well-being of our undergraduates. While focusing on academics, it important to attend to your physical and mental health as well. Anxiety and depression are all too common in high-stress environments. If you are concerned about yourself or a friend, please reach out to either the Chemistry Undergraduate Office or the Undergraduate Biochemistry Program (see below) who will direct you to the appropriate resources. If you, or anybody you know, is in need of mental health care, please refer to the following campus resources: (1) Counseling and Psychological Services, [CAPS](#). 215-898-7021 (off hours and weekends 215-349-5490); (2) Department of Public Safety 215-898- 7333, or 511 if imminent danger to themselves or others; (3) Finding Programs for Student Wellness through the [VPUL](#); and (4) [Student Health Services](#)
Inclusion and Diversity: At Penn Chemistry, we value the backgrounds and identities of all students (including but not limited to country of origin, race, class, religion, ethnicity, gender, sexual orientation and identity, and disability status), and are committed to providing an inclusive climate across the Department. If there are elements of your experiences, culture or identity that you would like to share with me as they relate to your success in this class, I am happy to meet to discuss. Likewise, if you have any concerns in this area or are facing any special issues or challenges, you are encouraged to discuss the matter with me (set up a meeting by email) with an assurance of full confidentiality, or with the Chemistry Undergraduate Office or the Undergraduate Biochemistry Program Office (see below).

Formal and Informal Accommodations:

The Chemistry Department at Penn is committed to assisting students requiring special accommodations for circumstances that are registered with the Office of Student Disability Services (SDS; <https://www.vpul.upenn.edu/lrc/sds/>). The University of Pennsylvania provides reasonable accommodations to students with disabilities who have self-identified and been approved by SDS. Students need to make arrangements with SDS. If you have not yet contacted SDS and would like to request accommodations or have questions, you can make an appointment by calling SDS at 215-573-9235. The office is located in the [Weingarten Learning Resources Center](#) at Stouffer Commons, 3702 Spruce Street, Suite 300. All services are confidential. If you are not formally registered with SDS and experience anxiety, depression, learning disabilities or other issues that affect your ability to fully

participate and learn in this class, you are encouraged to check-in with me or with the Chemistry Undergraduate Office or the Undergraduate Biochemistry Program Office (see below) so that we can help you to secure the resources to promote your success.

Contacts for Help:

For help with any of these issues, please feel free to reach out to the Chemistry Undergraduate Office [Professor Jeffrey Winkler, Undergraduate Chair (winkler@upenn.edu) or Ms. Candice Adams, Undergraduate Coordinator (chemugrad@sas.upenn.edu)] or the Biochemistry Undergraduate Office [Professors Elizabeth Rhoades (elizabeth.rhoades@sas.upenn.edu) and Jeffrey Saven (saven@sas.upenn.edu), Co-Chairs Undergraduate Biochemistry Program or Ms. Katherine Henkel, Undergraduate Biochemistry Program Coordinator (biochemistry@sas.upenn.edu)] who will direct you to the appropriate resources.

Class Structure Spring 2024: This course will be in-person. All assessments are in-person with no exceptions. Course materials will be available on-line if you are absent, but not all are equivalent to the materials provided in class so attendance is encouraged. For example, answer keys will be available from problem solving sessions, but recordings of the class meeting which will focus on approach/strategies will not be available.

What is Mastery Learning?: Under a mastery system, you are allowed to make mistakes with no penalty to your grade. This is accomplished by providing a second attempt to show mastery of the course material with smaller, more frequent assessments. Answers are either correct (mastery or proficiency for full points) or they are not (no points). Typically, the proficiency cutoff is 80% correct. There are 22 assessments, and **you will have up to two opportunities to take each one**. If you are unsatisfied with an outcome, you have an opportunity to figure out where you went wrong and take another version of the assessment. Problems increase in complexity through retrieval, comprehension, analysis, and knowledge utilization levels.

Synchronous Components: Students **are required** to be available during the lecture times, quiz time, and the recitation time that they registered for:

Lecture: M/W 1:45-2:45

Quiz: F 1:45-3:15

Recitations (one only): 410 W 8:30-9:30 am
411 W 12:00-1:00 pm
412 R 3:30-4:30 pm
413 R 5:15-6:15 pm
414 R 12:00-1:00 pm

The above times will be used in the following ways:

Lectures Monday and Wednesday:

- Students will be assigned two ~1 h lecture videos to watch before the class meeting
- Problems will be posted on-line 24 h in advance
- Problems will be worked and solved in class in small groups
- Participation is expected – substantial research shows that ALL students benefit from working problems together in this way

- These sessions will not be recorded
- Answer keys will be provided on Canvas after the session

Recitations

- Each student has one 1 h recitation per week
- Practice in problem-solving that facilitates questions and discussion
- Recitations review the problem sets
- Students should attempt the problem sets *before* attending
- Recitation problems sets target *mastery* of the material (not basic understanding).
- Recitation attendance is expected but not mandatory
- These sessions will not be recorded

Lecture Friday (Quizzes): see below for more info

Other synchronous components:

Office Hours:

- Instructor, TAs, and LAs will all hold office hours
- Will be provided throughout the day to accommodate different schedules
- Will be provided on each weekday
- Instructor office hours are difficult to find that accommodate each and every student, but we will try
- For content questions TA, LA, or instructor office hours are all equivalent
- For academic performance (vs. content), meetings can be scheduled outside the office hours with the instructor

Work Shops:

- Offered by the tutoring center
- In the past, regular workshop attendees did better in the course
- Workshop leader is not a course TA or LA, so can offer a different perspective
- Meets once per week
- Schedule and problems are set by the workshop leader, not the course instructor
- Provides an additional opportunity to work problems
- Can see how others approach problems
- Recommended for students who do better with interactive activities
- Recommended for students encountering difficulties in the course

Asynchronous Components: There are several asynchronous components:

Lectures

- Class material will be covered in prerecorded lectures
- Two ~50 min lectures per week
- Canvas keeps a record of which videos, and how much of them, you view
- Questions are embedded to help with attention/retention
- Will be posted one week in advance of relevant Group Problem Solving Sessions
- Cannot be downloaded

Reading:

- Reading a text to familiarize prior to lecture

- Reading a text for greater details/reinforcement of concepts not understood during lecture
- Alternately, can view videos from other sources to fill gaps

Recitation Problem Sets:

- Problem sets will be provided for each chapter
- Will be posted well in advance of recitation
- Maximal benefit will be obtained when done *before* recitation
- Answer keys will be posted Thursday mornings
- Problem solving strategies, but not answers, will be given on Piazza before the key is posted

Ed Discussion:

- Online forum to ask and answer questions – fastest way to get a question answered
- Should check daily
- All users must maintain a positive, respectful tone
- May only be used for course content
- Students are strongly encouraged to answer questions – if you can explain it, you know it!*
- To give students the opportunity to answer questions, TAs/LAs will not answer immediately
- Due to the volume of questions, answers may be short – this is not a sign of disrespect
- For more detailed/longer answers, office hours are better
- Not appropriate for grading questions
- Not appropriate for feedback to the instructors (anonymous Google form and course surveys will be used instead)
- Will be started completely anonymous; if users violate the above terms, the site will be suspended for a period. If further violations, the anonymous feature will be turned off for all users
- Users who violate the terms more than once will have their access rescinded

Additional Practice:

- Book problems
- Practice exams from prior years
- Additional problems from TAs or instructor

Typical Weekly Workload:

| | |
|--|----------------|
| •Watch recorded videos | 2 h |
| •Group Problem Solving Session | 1 h |
| •Recitation | 1 h |
| •Quiz | <1 h |
| •Office hours/Ed Discussion | 1 h |
| •Workshop | 1 h (optional) |
| •Recitation PS + Reading + Practice | 5 h |
| •Total Synchronous and Asynchronous | 11-12 h |

Pre-Covid vs Now:

Approximately 25% less material will be covered in this version of the course compared to the pre-COVID version. Ch 12 and 13 will no longer be covered in the lecture and selected material will not be covered for the remaining chapters. In pre-COVID semesters, 14 instructional weeks would be used. Here, we will use 12 instructional weeks. We will take a

full week off for Spring Break, there will be a mental health of one week, and 1.5 weeks will be review sessions.

Schedule (subject to change; Ch numbers refer to Wade):

| | | | |
|------------------------------|---------------------------------------|--------|---------------------------|
| Jan 19 | Introduction to the Course | | |
| Recitations begin January 19 | | | |
| Jan 22-26 | Module 1 | Ch 1,2 | Structure, Acidity |
| Jan 29-Feb 2 | Module 2 | Ch 3 | Conformation |
| Feb 5-9 | Module 3 | Ch 4 | Free radical halogenation |
| Feb 12-16 | Module 4 | Ch 5 | Stereochemistry |
| Feb 19-23 | Module 5 | Ch 6 | Alkyl halide substitution |
| Feb 26-March 1 | Module 6 | Ch 7 | Alkyl halide elimination |
| Mar 4-8 | Spring Break | | |
| Mar 11-15 | Module 7 | Ch 8 | Alkenes part 1 |
| Mar 18-22 | Module 8 | Ch 8 | Alkenes part 2 |
| Mar 25-29 | Module 9 | Ch 9 | Alkynes |
| Apr 1-5 | Mental Health Break (no lectures M/W) | | |
| Apr 8-12 | Module 10 | Ch 10 | Synthesis of Alcohols |
| Apr 15-19 | Review Synthesis Problems | | |
| Apr 22-26 | Module 11 | Ch 11 | Reactions of Alcohols |
| Apr 29 | Review | | |

Final Exam Time <https://www.registrar.upenn.edu/finals/index.html> TBA

There is no final exam – only for makeup of extended absences documented by dean; if there is a conflict, then the makeup period will be in Fall 2024

Quiz Schedule by Learning Module

| Fri Feb 2 | Fri Feb 9 | Fri Feb 16 | Fri Feb 23 | Fri Mar 1 | Fri Mar 15 | Fri Mar 22 | Fri Mar 29 | Fri Apr 5 | Fri Apr 12 | Fri Apr 19 | Fri Apr 26 | Wed May 1 |
|-----------|-----------|------------|------------|-----------|------------|------------|------------|-----------|------------|------------|------------|-----------|
| LM 1.1 | LM 1.1 | | | | | | | | | | | |
| LM 1.2 | LM 1.2 | | | | | | | | | | | |
| LM 2.1 | LM 2.1 | | | | | | | | | | | |
| LM 2.2 | LM 2.2 | | | | | | | | | | | |
| | | LM 3.1 | LM 3.1 | | | | | | | | | |
| | | LM 3.2 | LM 3.2 | | | | | | | | | |
| | | LM 4.1 | LM 4.1 | | | | | | | | | |
| | | LM 4.2 | LM 4.2 | | | | | | | | | |
| | | | | LM 5.1 | LM 5.1 | | | | | | | |

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|--|--|--|--|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|--|
| | | | | LM 5.2 | LM 5.2 | | | | | | | | |
| | | | | LM 6.1 | LM 6.1 | | | | | | | | |
| | | | | LM 6.2 | LM 6.2 | | | | | | | | |
| | | | | | | LM 7.1 | LM 7.1 | | | | | | |
| | | | | | | LM 7.2 | LM 7.2 | | | | | | |
| | | | | | | LM 8.1 | LM 8.1 | | | | | | |
| | | | | | | LM 8.2 | LM 8.2 | | | | | | |
| | | | | | | | | LM 9.1 | LM 9.1 | | | | |
| | | | | | | | | LM 9.2 | LM 9.2 | | | | |
| | | | | | | | | | LM 10.1 | LM 10.1 | | | |
| | | | | | | | | | LM 10.2 | LM 10.2 | | | |
| | | | | | | | | | | | LM 11.1 | LM 11.1 | |
| | | | | | | | | | | | LM 11.2 | LM 11.2 | |

Important Dates

| | | |
|------------|-----------|--------------------------------|
| Jan 31 | Tuesday | Course selection period ends |
| Feb 27 | Monday | Drop period ends |
| March 2-10 | M-F | Spring Break, NO CLASS/NO QUIZ |
| March 22 | Friday | Grade Change Deadline |
| April 2 | Monday | Withdrawal Deadline |
| April 1 | Monday | NO CLASS |
| April 3 | Wednesday | NO LECTURE |

Assignments & Assessments:

Quizzes:

- All quizzes must be taken Friday 1:45-3:15 pm at the times indicated on the schedule. No other quiz times will be offered.
- Each quiz will be *offered* two times
 - You are not guaranteed two attempts
 - However, you still have one chance to take a quiz if absent for the first attempt due to illness, etc.
 - No alternate time will be offered for the quiz before spring break – please plan travel accordingly
 - If you absent for all offerings of a quiz, you will need documentation from advising or your dean about an extended absence.
 - No make ups will be provided without such documentation
 - The only make ups for such absence will be during our scheduled final exam
- Students may take a quiz one or two times– highest score counts.
- Quizzes will be graded using Gradescope – that means no answers outside of designated areas on the page
- Accommodations in person are through SDS; can request an earlier start time, but the time must overlap 1:45-3:15 pm.
- Quizzes in person are closed-book and closed-note
- No electronic devices permitted for quizzes in person
- 22 learning modules (~two per chapter)
- Quiz time ~10 min per learning module – we offer more time, but it is not needed
- The highest score for each of the 22 quizzes will be used.
- All 22 quizzes are incorporated into the grade (no further drops).
- You will need to register for a Gradescope account to see your graded quizzes
- Quiz questions will be similar to problem set questions
- A practice quiz with answer key will be provided
 - This answer key will provide the minimal answers needed for full credit
 - It is not a study guide
 - Detailed explanations will not be provided (see problem set keys)
- Answer keys for quizzes will not be provided since we are using a Mastery Model
 - Research shows that providing answer keys prevents the learning needed to improve
- Regrade requests must be made in Gradescope within 2 d from when quizzes graded
- For regrades, we especially want to see requests if we made an error (like forgot to transfer a grade to the point total)
- 3 points per learning module
- If an answer is 80% correct, you will receive full credit for the question

I reserve the right to substitute the results of a live or via Zoom "verification oral exam" for any student, for any reason and at any time for any quiz during the semester. This will involve me directly asking the student questions related to the original quiz or exam questions and assigning a grade based on their written and/or verbal answers.

Essays:

- There will be two short essay (half page) assignments worth 1 point each

Lecture Videos:

- Questions are embedded in the videos to help with attention and retention
- Not graded

Group Problem Solving Session:

- **Please ask questions!**
- Participation not required, but strongly encouraged
- Not graded

Grading

- Quizzes: 22 Learning Modules (3 pt each) 66 points
- Two Essay Assignments (1 pt each) 2 points
- **Total 68 points**

| | | | |
|----------|----------|----------|---------|
| 61-68 A | 54-57 B+ | 44-46 C+ | 30-36 D |
| 58-60 A- | 51-53 B | 40-43 C | <30 F |
| | 47-50 B- | 37-39 C- | |

Note: If we mess up, and the final *average* grade is lower than a B+, then these point cutoffs will be modified. If the average is higher than a B+, the cutoffs **will not be altered** and everyone will be happy. Under this scheme, it is possible for everyone to get an A by mastering the material.

Essential Course Policies:**Text:**

- The material in lecture slides constitutes all of the required material for the course. Textbooks can serve to amplify and provide more detailed explanations/examples, but no text book is recommended or required for this course. The material largely follows the order in "Organic Chemistry" eighth edition by L. G. Wade, Jr. However, any textbook that covers the material covered can be helpful. A free online text is <http://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htm>. The Cengage OWLv2 for Organic Chemistry also comes with Wade text materials. An online video course can be found at <http://butane.chem.uiuc.edu/jsmoore/Cmap/CHEM232Fa12.html> Additional good videos can be found at: <https://www.jove.com/playlist?plid=d5y74arK>

Model kits:

- You need a good molecular model kit. Any kind is ok. One good one is: Molecular Visions (Organic, Inorganic, Organometallic) Molecular Model Kit #1 by Darling Models

Academic Integrity:

Your instructor and TAs consider it an honor to work with some of the best students in the world, and in turn we expect honorable behavior from you. While we encourage you to interact with and learn from your classmates, all graded assignments (quizzes) you turn in must be your own work. Penn's code of academic integrity can be found here: <https://catalog.upenn.edu/pennbook/code-of-academic-integrity>

- Those found cheating will be referred to the Office of Student Conduct
- Possible consequences are zero on the assignment, F in the course, note on your transcript, suspension, or expulsion.

- Correct answers for questions will be only be based on material covered in the course, not on external sources even if such answers are technically correct answers.
- You may not communicate with anyone, in any form (except TAs or instructors) during the entire quiz window about the quiz
- The course is graded based on mastery and a curve is not used
- Cheaters may benefit short term with higher grades, but
 - their scores will not affect the grade of anyone else in the course.
 - they will be less prepared for subsequent courses (Chem 242, Chem 249, Chem 251)
 - they will be less prepared for MCATs, etc.
 - they will not develop important skills (self-discipline, self-assessment, information retention/integration, organization of conceptual frameworks, complex problem solving/extrapolation, pattern recognition) which are the true benefit of this course
 - they will weaken their ethical framework which is linked to questionable behaviors later in life (lying to patients, falsifying taxes/insurance claims, cheating in relationships, cheating in games/sports, etc.)
- Examples of academic dishonesty include, but are not limited to:
 - Having someone take a quiz or exam for you
 - Communicating with someone else during a quiz or exam
 - Using notes during an in-person quiz
 - Copying from someone else's quiz
 - Receiving information from any person during a quiz or exam
 - Providing a false excuse for missed quizzes or exams
 - Attempting to do any of the above