

Chemistry 190: Organic Chemistry

Spring 2023

MWF 10 AM SCCT G027 and 11 AM SCCT 3024

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<i>Office Hours</i>	Mondays 2:30-4:30 PM, Thursdays 9:30-11:30 AM, Fridays 2:30-4 PM and by appointment
<i>Required Texts</i>	L. G Wade, <i>Organic Chemistry</i> , 8 th or 9 th Edition, Pearson Prentice Hall A. B. Padias, 2015, <i>Making the Connections A How-To Guide for Organic Chemistry Lab Techniques</i> , 3 rd Edition, Hayden-McNeil Freeman Laboratory Notebook
<i>Suggested Items</i>	J. W. Simek, <i>Solutions Manual for Organic Chemistry</i> , Pearson Prentice Hall Molecular Model Kit
<i>Grading</i>	Exams: 45% (three exams worth 15% each) Final Exam: 20% Homework: 10% Lab: 25% Class attendance is expected. In borderline cases I will take into account attendance/participation to determine a final letter grade.

Learning Goals

Organic Chemistry is a subject that you will likely find to be challenging but I hope that you will also find the study of organic chemistry to be rewarding in many ways. Most of you will not go on to be practicing organic chemists so many of the details of what we learn will not be important in the long term. But, the properties and reactions of organic molecules underlie most of the processes that sustain life, so knowledge of the fundamentals of organic chemistry is important for anyone studying biology, medicine, neuroscience, etc. Perhaps more important than the chemistry that you will learn in this class, though, is the practice that you will get in solving complex problems. You will be exposed to a lot of information in this class; solving problems often involves considering numerous different underlying concepts to decide which are relevant and then to analyze how they intersect with one another to influence the properties of molecules.

In terms of the College's educational goals, Organic Chemistry will pique your ***Intellectual Curiosity*** and foster ***Intellectual Flexibility*** in problem solving. The relationship of the course to ***Analytical Discernment*** is probably obvious, although there is much less math involved in Organic Chemistry than what you are used to from previous chemistry classes. Less obvious is the fact that the course will address ideas of ***Aesthetic Discernment***, not so much in evaluating artistic quality, but organic structures are three-dimensional and symmetry plays a large role in determining properties so learning to visualize and evaluate the quality and properties of form and shape is important. Through the laboratory and through problem-solving, once you have some of the fundamentals under your belt, you will engage in ***Disciplinary Practices*** that model what chemists do in the real world. In many aspects of organic chemistry there is no "right" answer but numerous ways that one could solve a particular problem so ***Creativity*** is very important. While there are no formal writing assignments, ***Communication and Expression*** are critical parts of the course. Many problems on assignments and exams require short written explanations, giving you ample practice in communicating your understanding of complex ideas, and many of the lab reports require a written analysis of experimental data in the context of the fundamental ideas that you are learning in the course. While fostering better ***Understanding of Cultural Diversity*** is not a major focus of this course, I expect our classroom to be an open one where everyone's ideas are respected and valued and I will try to highlight the fact that our understanding of organic chemistry is derived from the contributions of diverse scientists from around the world. Finally, the increased knowledge of science and the scientific method that you gain from this course will help you to become a more ***Ethical, Informed and Engaged Citizen***.

Exams

Dates for the exams are: Thursday, February 16, 7:00 PM in SCCT 3024
 Thursday, March 9, 7:00 PM in SCCT 3024
 Thursday, April 20, 7:00 PM in SCCT 3024

Exams will last for approximately two and a half hours. If you have a conflict with any of these dates and times, please arrange with me at least three days in advance to take the exam at some other time. I recognize that there are circumstances when students have an overwhelming amount of work in the week of an exam and I am willing to grant a short extension in order to allow you to properly prepare for the exam. If you find yourself in this situation, please contact me at least a day before the exam. Normally, only one such extension will be granted to any one student during the semester and you will be expected to complete the exam within forty-eight hours of the scheduled time.

Final Exam

The final exam is scheduled for Sunday May 14 from 7 PM–10 PM in the SCCT Auditorium (10 AM Section) and Sunday May 14 from 9 AM–12 PM in SCCT 3024 (11 AM Section). The final exam will be cumulative but it will emphasize the material covered in lecture after the third exam.

Homework

Homework will be assigned in four different forms: practice problems, drill problems, homework sets and problem sets.

- *Practice problems* are problems from the textbook that I think are especially relevant. A list of practice problems from the textbook is included with this syllabus. I urge you to do these problems to help you learn the basic material but they will not be collected.
- *Drill problems* will be assigned for each lecture for which another assignment is not due. These will be short assignments with simple problems that are intended to reinforce the concepts covered in the previous lecture. These will not be handed out in class; it will be your responsibility to download the assignments from Blackboard. The drill problem assignments will be collected and full answer keys will be posted on Blackboard but they will not be graded for accuracy so it will be up to you to check the key to see if you have done the problems correctly. Drill problems will count for 20% of the homework grade.
- *Homework sets* will count for 20% of your homework grade and will be due on Fridays in weeks when there is not a problem set due or an exam. Homework set problems will be a little bit more difficult than drill problems and are designed to help you start to see the material in a broader context. The homework sets will be corrected but will be graded on a plus/minus/zero scale based on effort not accuracy.
- *Problem sets* will make up 60% of your homework grade. A problem set will be distributed approximately ten days before each exam (including the final) to be turned in one week later. The difficulty of the problem sets approximates the difficulty of the exams and the problems are designed to give you practice in connecting different course concepts. The problem sets will be graded on a 15 point scale.

Homework and problem set assignments will be handed out in class and will also be available on Blackboard. Drill Problem assignments will only be posted on Blackboard. You may work together on any of these assignments. However, the more independent you are in working problems, the better prepared you will be for the exams.

Extensions and Policy on Late Work

I understand that it may sometimes be difficult to complete work on time and I am happy to consider extensions on Drill Problems, Homeworks or Problem Sets but these must be requested no later than the day before the assignment is due. Unless previously arranged, Drill Problems will not be accepted after the due date, late Homeworks will be accepted but given a minus and late problem sets will be assessed a penalty of ten percent for each day late. *No late assignment will be accepted after you begin taking the exam for which the assignment is relevant.*

Lab

All students should come to lab with a Freeman Laboratory Notebook, a lab coat and a pair of safety glasses. You should also wear appropriate clothing, *i.e.* no shorts and no open-toed shoes. Laboratory is an essential part of the course. If you have a failing grade in the laboratory, you will fail the course. *Failure to turn in two or more lab reports will constitute an automatic failure of the course!* See the lab syllabus for more details.

Help Sessions

I will hold weekly help sessions on Wednesday nights at 8 PM, initially on Zoom.

(<https://hamilton.zoom.us/j/98522925047?pwd=cjhJdG16VHFJTWZkazJMdjZ3UFNrdz09>)

These will give you a chance to ask questions and to work extra problems in small groups.

Attendance is not required but is strongly recommended. In addition, Prof. Majireck will hold a weekly help session at 6 PM on Wednesdays in the SCCT Auditorium and there will be two sessions run by students.

Communication

I will communicate important information about assignments, exams, help sessions, etc. by email so you are encouraged to check your email (and to read the emails that you receive!).

Blackboard Resources

Many course resources will be posted on Blackboard. The Blackboard sites for all four lecture sections have been combined so that all students have access to the materials provided by each professor. Included in the folder for the Rosenstein section is a folder that contains all of the handouts that will be distributed in class, a folder with the complete course lecture notes and a folder with partial lecture notes that contain the text from the notes but not the figures. Also within the folder for the Rosenstein section, there are folders with all of the assigned work for the semester which will include both assignments and detailed answer keys. In addition, there is a folder for practice problems that will include problems used at some of the help sessions (usually assignments from previous years) and extra sets of problems posted about a week before each of the exams. Also available are copies of the exams and answer keys from last year that can be used as practice before each exam. Answer keys from this year's exams will also be posted once all students have completed the exam. If you would like additional practice problems beyond what is available in the folder for the Rosenstein section, you are encouraged to use assignments from the Majireck section.

The Blackboard page also has a folder for "Lab Materials". As the name implies, this folder will have all of the documents needed for the lab portion of the course including general information (the lab syllabus, lab report checklist, etc.), the weekly lab handouts and any lab data that is posted for class use. Please note that the weekly lab handouts will not be distributed in class; you will need to download them from Blackboard.

Honor Code

As with all courses at Hamilton, you are expected to abide by the honor code. You may collaborate on practice problems, drill problems, homework sets and problem sets. Exams are to be done individually and no books, notes or other sources may be consulted while taking exams. In lab, when students work together, only the data is shared; all reports must be done individually. Any prior discussion must be acknowledged in the report and work based on existing written material (the textbook, journal sources, online sources) must be properly cited.

Disability Policy

In compliance with Hamilton College policy and equal access laws, I am available to discuss appropriate academic accommodations that may be required for students with disabilities. Requests for academic accommodations are best made during the first two weeks of the semester, except for unusual circumstances, so arrangements can be implemented. Students should contact Allen Harrison in the Office of the Dean of Students (Elihu Root House; ext. 4021) to verify their eligibility for appropriate accommodations.

Mental Health and Organic Chemistry

Organic chemistry is a difficult subject to master. Learning it well requires discipline and a huge amount of effort. My goal is to challenge you throughout the semester with the goal of helping you to learn as effectively as possible and I will do my best to provide you with the resources and support necessary to meet that goal. I recognize, though, that Organic Chemistry is a stressful course that can trigger or exacerbate anxiety, depression or other mental health issues. If at any time you are feeling overwhelmed, I encourage you to speak with me about ways we can schedule assignments or exams to relieve some of your stress and/or to seek out resources on campus that may be helpful. These include:

- the Counseling Center (www.hamilton.edu/offices/counselingcenter, 315-859-4340) located at 100 College Hill Road offers individual and group therapy, peer counselors, psychiatric treatment, and a 24-hour hotline. If you need immediate assistance, phoning the Counseling Center and selecting option 2 will connect you with a counselor, 24 hours a day, 7 days a week.
- the Associate Dean of Students for Student Support, Sarah Solomon (315-859-4600; ssolomon@hamilton.edu)
- the Associate Dean of Students for Academics, Adam Van Wynsberghe (315-859-4600; avanwyns@hamilton.edu)
- Your faculty advisor
- Your RA and Area Director in your residence hall

If at any time you feel suicidal or in danger of harming yourself or others, please reach out for support! The Hamilton community cares and is available to help. Campus Safety is available 24/7 for urgent concerns at 315-859-4000.

Tips for Succeeding in Organic Chemistry

- Working problems is critical but how you do problems is more important than how many problems you do: take the time to think about what you are learning from each problem that you do. You will not see a problem on an exam that you have previously seen as a practice/drill/homework/problem set problem so learning the answers to the problems is not important. Learning how to approach a problem and how to think through a solution is what matters.
- Think of the different types of assignments as a pyramid, with book problems at the bottom and exams at the top. Doing problems from the book helps you to learn the basic

concepts in a very directed manner, which provides a foundation for doing drill problems, which support homeworks, etc. If your foundation is weak, the top of the pyramid will be shaky.

- ***Google is not your friend!*** If you use Google to search for the answer to a problem, you may get two points for a correct answer on a problem set but you'll also likely lose fifteen points on an exam because you did not learn the skills you should have learned by thinking through the problem.
- Start assignments early. Answers to some problems may not come to you right away so having time to ponder them, to ask questions in office hours or at the QSR Center, or to discuss them with classmates is important and will minimize the likelihood that you will resort to using Google (see above).
- Do some work for the course every day. As above with assignments, it can take some time for ideas to sink in. If you can spread out your learning over a few weeks for each unit, instead of relying on intense studying over a few days right before each exam, you will be in a much better position to gain the deeper understanding necessary to excel.
- Be engaged during class. We typically cover about four pages of notes per day. Look over what we are likely to cover before the start of class so that you have a sense of what we will be talking about. During class, make notes to yourself about things that weren't clear. I welcome questions so please ask them during class, if you feel comfortable doing so, or come ask questions later. After class, look back over the notes to identify anything else that you don't understand. Then, *don't ignore those things*. Think about them further on your own, do relevant practice problems, and use other resources, including the textbook, online sources, the QSR Center, classmates or ask me questions in office hours or at help sessions. Don't wait until two days before the exam to clear up fundamental ideas. The last few days before an exam should be used to work on your thinking skills in applying fundamental concepts, not on learning the basics.
- Find a community. It can really help to have other people to bounce ideas off of and to work problems with. Form a study group with friends in the class, even if they're in a different section. If you don't know anyone, attend help sessions, get involved with ROOTS, or go to drop in hours at the QSR Center. These may provide enough of a community or you may get to know some people through these interactions that you can study with more regularly.
- However..... use this community wisely. You may talk with others about any assignment except exams but do this to discuss ideas, not to get answers. If you're stuck on a problem, ask for a hint on how to get started, don't ask for the answer. Work together on problems but don't rely on others to do the work for you.
- If you feel that you are having trouble, get help early in the semester. Don't wait until after the second exam to try to get help; at that point, it will be very challenging to turn things around. There are lots of resources available. Come to office hours, schedule an appointment outside of formal office hours, go to the QSR Center, ask for a tutor. *Asking for help is not a sign of weakness but a sign of strength, showing that you are engaged and willing to do what is necessary to learn as much as possible.*
- Don't try to memorize everything! There is a lot that you will need to remember in organic chemistry but if you understand underlying, fundamental concepts, the amount of rote memorization that you should need to do is greatly reduced. Developing understanding and not simply memorizing is critical for those who plan to take both semesters of organic chemistry. For many it is possible to get a good grade in the first semester course relying heavily on memorization but students who do this generally have

a difficult time in the second semester. Information learned by memorization is forgotten quickly and everything you learn in the first semester course will be needed in the second semester, as well, and will need to be relearned while also trying to keep on top of new material.

- Learn from the lab. While the focus of several of the labs is to teach you fundamental laboratory skills and techniques, each experiment is grounded in some way in the underlying concepts that we will be learning in lecture. For some experiments, the connection to the lecture (and exams) is obvious, for others it is less so. Carrying out the experiments and writing up the lab reports gives you an opportunity to learn organic concepts from a different perspective that should reinforce the lecture materials. Approach labs as a learning opportunity and not just something to get done as quickly as possible.
- The common theme in each of the points above is take responsibility for your own learning. What you get out of the course is proportional to what you put into it.

Approximate Lecture Schedule

<u>Date</u>	<u>Topic</u>	<u>Chapter in Wade</u>
1/18	Introduction	--
1/20, 23, 25	Structure and Bonding	1
1/27, 30, 2/1	Intermolecular Forces and Acids and Bases	2
2/3, 6, 8	Infrared Spectroscopy and Mass Spectrometry	12
2/10, 13, 15, 17	Conformational Analysis of Alkanes	3
2/16	EXAM 1 covering Chapters 1, 2, 12	
2/20, 22, 24	Reaction Mechanisms, Thermodynamics and Kinetics	4
2/27, 3/1, 3, 6	Stereochemistry	5
3/9	EXAM 2 covering Chapters 3, 4, 5	
3/8, 10, 27, 29, 31	Nuclear Magnetic Resonance Spectroscopy	13
4/3, 5, 7, 10	Nucleophilic Substitution Reactions	6
4/12, 14, 17	Elimination Reactions	7
4/20	EXAM 3 covering Chapters 5, 6, 7	
4/19, 21, 24, 26	Reactions of Alkenes	8
4/28, 5/1, 3	Structure and Synthesis of Alcohols	10
5/5, 8	Reactions of Alcohols	11
5/14	Cumulative FINAL EXAM with an emphasis on Chapters 8, 10, 11	

Chemistry 190: Organic Chemistry

List of Suggested Practice Problems from Wade's Organic Chemistry

Ninth Edition

- Chapter 1: 2, 3, 5-9, 11-13, 16-22, 24-26, 29, 31-35, 37, 40-45, 49-54, 58, 59
- Chapter 2: 2-4, 6, 7, 9-11, 13-18, 20-23, 25-27, 29-43, 45, 46, 49, 50, 52, 53, 56, 57
- Chapter 12: 2-7, 14-16, 19, 23-25, 27, 28, 30
- Chapter 3: 2, 3, 5-8, 11, 13, 15-17, 19-22, 25, 26, 28, 30, 33, 34, 36, 39, 41, 42, 44-46, 48, 50, 51
- Chapter 4: 2-4, 6-11, 13-21, 24, 25, 28-35, 39-47, 49, 51, 53, 55
- Chapter 13: 2-8, 10, 11, 13, 15, 16, 18, 21, 22, 24, 25, 28-33, 36, 38-40, 42, 44, 47, 48, 53, 54
- Chapter 5: 2, 5, 6, 8, 9, 12-15, 20-22, 25-27, 30, 31, 33, 34, 36-39
- Chapter 6: 8-12, 14-29, 30, 33-37, 39-43, 45, 49-51, 53-56
- Chapter 7: 2, 4, 8, 12, 14-18, 20, 22-26, 28-33, 35, 37-39, 41, 42, 49, 52, 54-56, 61-65, 67, 69-76
- Chapter 8: 1-11, 13-24, 27-30, 32-37, 43-51, 56, 58-70, 78
- Chapter 9: 4-8, 12-25, 30-34, 36-43
- Chapter 10: 8-27, 34, 36-49, 51, 53-55
- Chapter 11: 1-6, 9-13, 15-17, 19-23, 25-29, 31, 33-49, 51-58, 60, 61, 63

Chemistry 190: Organic Chemistry

List of Suggested Practice Problems from Wade's Organic Chemistry

Eighth Edition

- Chapter 1: 2, 3, 5-11, 14-20, 23, 25-29, 31, 34-53
- Chapter 2: 2-8, 10, 11, 13-15, 17, 18, 20-23, 25-30, 34-42, 44
- Chapter 12: 2-7, 14-16, 19, 23-25, 27, 28
- Chapter 3: 2, 3, 5-8, 12, 14-16, 18-21, 24, 25, 27, 29, 32-34, 37, 39, 40, 42-44, 46, 48, 49
- Chapter 4: 2-4, 6-11, 13-21, 24, 25, 28-35, 38-46, 48, 50, 52, 54
- Chapter 13: 2-8, 10, 11, 13, 15, 16, 18, 21, 22, 24, 25, 28-33, 36, 38-40, 42, 44, 47, 48, 52
- Chapter 5: 2, 5, 6, 8, 9, 12-15, 20-22, 25-27, 30, 31, 33, 34, 36-39
- Chapter 6: 8-12, 14-29, 32-34, 37, 38, 40, 41, 44-48, 50-54, 56, 59-64, 66-76
- Chapter 7: 2, 4, 8, 9, 11-19, 24, 25, 27-30, 33, 36, 38, 40-42, 44-46, 48, 49, 51, 54-59
- Chapter 8: 1-11, 13-24, 27-30, 32-37, 43-50, 54-70, 72
- Chapter 9: 4-8, 12-26, 30-34, 36-43
- Chapter 10: 8-27, 30, 35, 37-49, 51, 53
- Chapter 11: 1-6, 9-13, 15-17, 19-23, 25-29, 31, 33-49, 51-58, 60, 61, 63