University of Wisconsin- Madison
CHEMISTRY 345 – Section 2 – Fall 2019
Intermediate Organic Chemistry
T/Th 9:30 – 10:45 AM
Room 204, Educational Sciences

Instructor:	Professor Jennifer M. Schomaker 8112 Shain Research Tower, Chemistry schomakerj@chem.wisc.edu
Office Hours:	Schomaker: Fridays from 1-2 PM; 8112 Shain
Teaching Assistants: Chemistry B317	Josh Corbin (corbin2@wisc.edu); Friday, 2:25 PM; Tuesday, 11 AM and 12:05 PM Minsoo Ju (ju3@wisc.edu); Wednesday, 4:35 PM, 5:40 PM Sam Kougias (kougias@wisc.edu); Monday, 3:30 PM; Tuesday, 3:30 PM and 4:35 PM
Website:	Canvas, https://canvas.wisc.edu/courses/105442 https://at.doit.wisc.edu/learn-uw/canvas/

I. INTRODUCTION

Catalog course description: Chemistry 345 is the second course of a two-semester sequence in organic chemistry. It covers diverse themes in organic reactivity, building on a foundation provided in Chemistry 343. Chemistry 341 does not satisfy the prerequisite for 345.

Learning Outcomes:

a) Interpret, visualize, and predict reactivity of molecules.
b) Interpret NMR and IR spectral information and either support a proposed chemical structure or deduce the structure of an unknown compound.
c) Be able to provide starting materials, reagents, and/or products for a variety of chemical transformations.
d) Understand the concepts in the course textbook, particularly Chapters 12, 13, and 16-28.

Catalog requisites: Grade of C or better in CHEM 343.

Course designations and attributes: Intermediate level, physical science breadth, counts as L&S credit

Instruction mode: classroom instruction

Credits: 3

How credit hours are met: This class meets for three 50-minute lectures and one 50-minute discussion each week. The credit standard for this course is met by an expectation of a total of 135 hours of student engagement with the course learning activities (at least 45 hours per credit), which includes class attendance, reading, studying, problem sets, and other student work as described in the syllabus.

II. COURSE MATERIALS

Textbooks:
Required:
Organic Chemistry (6th edition), M. Louden.

Recommended:
Solution Manual for Louden, *Organic Chemistry*

Other materials:

Recommended:
Molecular model kit

**These materials are available from the UW Bookstore. $AX\Sigma$ also sells model kits in the lobby during the first few weeks of class.*

You are allowed to use models during your examinations.
Course websites: This course makes extensive use of Canvas (https://at.doit.wisc.edu/learn-uw/canvas/). Lecture notes, handouts, problem sets, reading assignments, and announcements will be posted to the course website regularly. You will also use Canvas to view your grades.

III. LECTURE AND DISCUSSION

Preparation: Chem 345 will cover Ch 12–13, 16–23 and 28 of Louden. Ch 1–11 and 14–15 were covered in Chem 343. Because of the cumulative nature of the organic chemistry sequence, you must be comfortable with all of the material covered in Chem 343. If you are not, I would strongly suggest that you seek help through the Chemistry Learning Center, on-line tutorials or a private tutor. I cannot help you catch up on material you missed from Chem 343, as much as I would like to. There is simply too much to cover in Chem 345.

Lecture: Attendance is a good idea for success in this course. There are days when you may not feel like getting out of bed (believe me, I have those days, too), but I tend to give a lot of hints and shortcuts that aren't always captured in the written notes. Since I derive a lot of my enthusiasm from interacting with students in person, I rarely post videos of my course on-line unless I am going to be out-of-town, so the only way to get this additional info is to come to class! I love teaching organic chemistry and am pulling for everyone to get an "A" because 1) I am a nice person and like others to be happy, 2) I remain hopelessly optimistic despite being old enough to know better, and 3) I think organic chemistry is totally cool and want you to appreciate the role it plays in addressing challenges we face as a society. Lectures are designed to highlight the important concepts, provide supplemental examples in addition to examples from your textbook, help you understand broad themes of chemical reactivity and connect the basic science to advances that have greatly benefited modern society. The best approach is to read the material prior to lecture and then use lecture to clarify issues and "connect the dots" so to speak. I will post written lecture notes to Canvas (https://at.doit.wisc.edu/learn-uw/canvas/); however, they are meant to help with occasional absences due to illness or other unavoidable conflicts, and are not intended to serve as a replacement for lecture.

Reading: Suggested reading assignments revolve largely around chapters in your textbook and are included in the course outline at the end of this syllabus. The textbook provides more detailed information than the lecture can cover; all information covered in the assigned reading is fair game for exams. However, my past experience in teaching this course is that I tend to emphasize what I find most important during the lectures and the review sessions. I've never gone to the textbook to look for a "gotcha" question, but the book is still worth reading to obtain more in-depth discussions

on lecture topics. I also give out problem sets that are designed to stress the things that I think are most important for you to know. I will sometimes draw on the textbook problems for inspiration, or occasionally use a problem directly on an exam. However, attending the lecture and working through the assigned problem sets is usually sufficient. To my knowledge, students have not found it necessary to work every single problem at the end of a chapter, but I am happy to help should you have any questions.

On-line problems: I will not give credit for on-line homework, but some of you might find the Sapling website helpful. To sign up, go to http://bit.ly/saplinginstructions. Sapling Learning offers a grace period on payment; for most courses, this is 14 days from the first day of the term. During sign up or throughout the term, if you have any technical problems or grading issues, please send an email to support@saplinglearning.com explaining the issue. I will not provide any support for Sapling, so I will not answer any e-mails related to questions concerning this resource. For a short introductory video to using Sapling, see: https://vimeo.com/72453315.

Discussion sections: The main purpose of the discussion section is to get guided help on problem-solving from experienced TAs and classmates. To get the most out of section, come prepared with specific questions on concepts, problems, and reading material that you find most challenging. The TAs for your course are all accomplished and experienced. They may choose to run their discussion sections differently, but both will be valuable to you in better understanding the course material. Worksheets, class discussion and going over suggested and assigned homework all are possibilities. A portion of your grade will be determined by short quizzes that will be given at the end of class. These quizzes are designed to ensure that you understand the key concepts discussed in class and to help us identify trouble areas that require additional discussion.

Getting help: We will use Piazza as an on-line forum for the class to ask questions and get feedback from myself and fellow students. The TAs and I have multiple research responsibilities in addition to teaching, so we unfortunately cannot answer all of your questions immediately. I will TRY to be on-line to address any concerns at least once a day, most likely in the evening around 10 PM or so. In this manner, the entire class will have access to questions posed by other students in the course.

To sign up: piazza.com/wisc/fall2019/chem345
Link to our class page: https://piazza.com/configure-classes/fall2019/chem345

In addition, I will collect the names and e-mails of students interested in setting up study groups (send an e-mail to me at schomakerj@chem.wisc.edu with the heading "CHEM 345 Study Group"). I will compile a list and make it available to all those that have contacted me.

Etiquette: If you want to yap with your neighbor during class, please sit in the back so I'm not distracted. Any comments about my 'meanness' come from calling out students for talking while I'm trying to lecture! Just don't bother coming to lecture if you can't respect others in the course.

IV. ASSIGNMENTS AND GRADING

Homework: Five problem sets will be assigned over the course of the semester. I will not be grading these problem sets, but solutions will be provided on-line. The bulk of exam questions will be of a similar nature and level of difficulty as the problem sets. Doing homework problems from the textbook can certainly be helpful, but I want to emphasize that these problems are not at the same level of difficulty and complexity as the problem sets! Do not neglect putting in the necessary time on these exercises, or you are not likely to do well on exams. I prefer to use 'real-life' syntheses in my exams, as opposed to contrived problems that require you to simply regurgitate

material. This can make things more difficult for those of you used to memorization, so the sooner you learn to recognize patterns of reactivity and 'think outside the box', the better off you will be.

Study groups: Learning is more enjoyable and more effective when problems are worked collaboratively. Studying and working problems in groups is strongly recommended. Collaboration on problem sets is strongly encouraged.

Midterm exams: There will be three midterm exams (150 points each). Exams will be given during the normal lecture period. Makeup exams will not be given- if you miss an exam, your grade will be calculated using Formula 2. It has been necessary to institute this policy due to abuse of "make-up" exams in the past. However, if you work with the McBurney Resource Center and need alternate accommodations for the exams, please speak with me as soon as possible to make the necessary arrangements.

Re-grade requests: Re-grade request forms can be downloaded from Canvas and attached to your exam booklet. These are due the day of the lecture after the exam is handed back. This again will be variable and I will do my best to give you plenty of time to look over your answers, as the TAs and I can and do make mistakes! Please, do not write on your exams after they have been handed back. Exams that have been modified in any way are not eligible for re-grading. We will scan all exams prior to grading. If you plan on changing answers after the exam has been returned, don't bother to submit a re-grade (see the Academic Misconduct discussion below). **On principle, I ignore any exam regrade requests that use the word "deserve."**

Final exam: The final exam is currently scheduled for Monday, December 17, 5:05 pm – 7:05 pm. I will announce the location closer to the end of the semester. The final will be cumulative and will be worth 200 points.

Grades: A maximum of 750 points can be earned during the semester. Your final score will be computed using one of the following formulae, depending on which results in the highest numerical value:

Formula 1:			Formula 2: Top 2 midterm exam scores:	
	Exam 1	150		300
	Exam 2	150		
	Exam 3	150		
	Molecule assign.	25	Molecule assign.	25
	Discussion quizzes	75	Discussion quizzes	75
	Final	200	Final	350
	TOTAL	**750**	**TOTAL**	**750**

Molecule assignment: The molecule assignment basically entails a brief write-up (in either Word or PowerPoint form) about a molecule that you find interesting. The structure of the molecule, a few details about its physical properties, history and uses should be included. Please include references as to your sources- Wikipedia is fine, as long as you include the appropriate citations. Every lecture period, I will choose 2-3 submissions and display them before class for 5 extra credit points. Since I do this in PowerPoint format, students that submit the assignment in this form have a better shot at the extra credit ☺ Examples of previous submissions are available on Canvas.

Discussion quizzes: Your TAs will hold four quizzes throughout the semester that will comprise 75 points of your overall grade. These quizzes will be worth 25 points each and the lowest score will be dropped. Quizzes are tentatively scheduled for 9/20, 10/18, 11/15, and 12/6.

Extra credit: The coolest part of being an organic chemist is the chance to develop brand-new reactions and make molecules that have never been made before! Your textbook only discusses well-established chemistry (boring!) and doesn't capture the true excitement of the field. Because of this, I always like to give a couple of extra credit assignments where I give you 'hot' articles from the literature to read and ask you to compare and contrast these state-of-the-art chemistries with the reactions you've learned in class. The number and point assignments for these extra credit opportunities are at my discretion and are 'extra' points. In other words, these points are added to your point total and your percentage calculated using [(point total)/750 x 100]. The downside is that if everyone in the class decides to do the extra credit, it won't help your overall position in the course. Fortunately, this is never the case, so the extra credit does help!

I try to make the molecules that we discuss in class and the ones that you see on problem sets/exams relevant to everyday life, rather than just making up random examples to illustrate concepts. Another way to earn extra credit is to bring to my attention recent articles or examples that describe chemistry related to topics discussed in class. Even better is to make a slide that I can show to the class!

Final grades: Letter grades are not assigned until the end of the course. The number of points you have accumulated through your work during the semester will be the only factor in determining your final grade. I may elect to curve the course, but my willingness to do so will be based on the attitude, participation and hard work of the students in the course.

However……..

If you earn 90% of the total points, you will receive an A.
If you earn 78% of the total points, you will receive at least a B.
If you earn 58% of the total points, you will receive at least a C.
If you earn 40% of the total points, you will receive at least a D.
Note: If you receive an 88%, this can be an A, AB, or B, depending on the final distribution. 89.5% is considered to be 90%; anything less is still 89%.

The actual grade cut-offs are determined by the final distribution, natural 'spacing' in the point distribution, and the historical grade history of all of the sections of Chem 345. **I do not know what these will be until the end of the course.** The Final Cutoffs will not be released, as there will always be someone with the highest AB, highest B, etc. That is the way of the world. It is conceivable that you will miss a cutoff by one point. We will try to choose the cutoffs so that does not happen, but there are no guarantees.

V. ACADEMIC MISCONDUCT

All scientific fields, including the engineering and health professions, demand strict standards of professional integrity. I have the same expectations for students in my courses and take all instances of academic misconduct very seriously. If the teaching staff and I determine that you have cheated in Chem 345, you will receive an F for the semester, and your case will be recommended to the Dean of Students for further sanction.

VI. UNIVERSITY POLICY ON RELIGIOUS HOLIDAYS

The following three guidelines have been developed to provide clarity concerning the UW policy on religious holidays: (1) Students **MUST NOTIFY** me within the first two weeks of class of the specific days or dates on which they request relief. (2) Make-ups may be scheduled before or after the regularly scheduled requirements. (3) Instructors may set reasonable limits on the total number of days claimed by any one student.

Tentative agenda (subject to change depending on the pace at which topics are covered)

Week	Date	Chapter	Lecture material	Assignments
1	Sept 5	Intro/Review/Ch 12	IR Spectroscopy	PS #1 out
2	Sep 10 Sep 12	Ch 13 Ch 13	NMR Spectroscopy NMR Spectroscopy	
3	Sep 17 Sep 19	Ch 13 Ch 16	NMR Spectroscopy Electrophilic Aromatic Substitution	Sept 20- QUIZ
4	Sep 24 Sep 26	Ch 16 Ch 17	Electrophilic Aromatic Substitution Allylic and Benzylic Reactivity	
5	Oct 1 Oct 3	**MIDTERM EXAM 1** Ch 17/18	**IN LECTURE (Ch. 12, 13, 16)** Allylic and Benzylic Reactivity	PS #2 out
6	Oct 8 Oct 10	Ch 18 Ch 18	Aryl and Vinyl Halides and Phenols Aryl and Vinyl Halides and Phenols	
7	Oct 15 Oct 17	Ch 18 Ch 19	Transition Metal-Catalyzed Reactions Aldehydes and Ketones	Oct 18- QUIZ
8	Oct 22 Oct 24	Ch 19 Ch 20	Aldehydes and Ketones Carboxylic Acids	PS #3 out
9	Oct 29 Oct 31	**MIDTERM EXAM 2** Ch 20/21	**IN LECTURE (Ch. 17-19)** Acids/Carboxylic Acid Derivatives	
10	Nov 5 Nov 7	Ch 21 Ch 22	Carboxylic Acid Derivatives Enols and enolates	PS #4 out
11	Nov 12 Nov 14	Ch 22 Ch 22	Enols and enolates Enols and enolates	Nov 15- QUIZ
12	Nov 19 Nov 21	Ch 23 Ch 23	Amines Amines	
13	Nov 26 Nov 28	**MIDTERM EXAM 3** **THANKSGIVING**	**IN LECTURE (Ch. 20, 21, 22, 23)** **THANKSGIVING- NO CLASS**	PS #5 out
14	Dec 3 Dec 5	Ch 28 (15) Ch 28	Pericyclic Reactions- Ch 15 review Pericyclic Reactions	Dec 6- QUIZ
15	Dec 10 TBD	Ch 28 **REVIEW FOR FINAL**	Pericyclic Reactions **REVIEW**	
FINAL EXAM: Tuesday, December 17, 2:45 pm –4:45 pm				

VII. MENTAL HEALTH RESOURCES

Students have a tendency to equate grades with future happiness, but a low grade is not the end of the world. However, if you feel that you are having a hard time coping or just need to vent, there are resources available on campus for you. Take advantage of them.

University Health Services (UHS):
Offers group, individual, couple/partner therapy stress management, and disordered eating assessments and treatment at no cost.
Student Activity Center, 7th floor Phone: 608-265-5600
www.uhs.wisc.edu/mentalhealth/getting-started

Ask.Listen.Save is a student organization that aims to prevent suicide by reducing the stigma of mental illness. Through educating the student body, they aim to increase the awareness and create a safe environment in which students know they are not alone and feel free to ask for help.

Student Activity Center, Suite 3196 www.Asklistensave.org

Badgerspill is a peer-to-peer support network of and for UW-Madison students. You can write in online to "spill" or vent privately and get unbiased feedback, empathy, and resources from other students who have dealt with similar situations. Both parties are anonymous to one another and the spiller gets multiple responses within 24 hours (www.badgerspill.com).

Strategies for success in this class.

1. **Don't fall behind!** This class asks you to absorb a lot of information at a rapid pace, and each successive chapter builds upon principles in the previous chapters. Cramming just doesn't work in this class. Instead, you should set aside a little time every day (30 minutes or so) to study and keep caught up. I will say this over and over again- memorization is NOT the way to do well in organic chemistry. There are instructors who will teach in this fashion, but I am not one of them. However, if you work at understanding the key principles governing reactivity, it won't matter what molecule I give you or what functional groups are present- you'll understand the rules and be able to readily solve problems that you have not seen before in either lecture or in your textbook.

2. **Practice, practice, practice.** This is the most important key to success in this course.

   It's a truism among endurance athletes that you train for the event that you're racing in. That is, you can't train for a marathon without running, and you'll never win a bike race if you don't ever climb on the bike. The same is true of your classes. In this course, the exams that make up the majority of the points you earn ask you to solve problems. Therefore, you should train for exams by working problems, and the more problems you do, the better off you are. This is why I ask you to do so many problems, between the problem sets and the suggested problems from the book. Louden is a great textbook, and one of the reasons we selected it is the quality of the problems at the end of each chapter.

3. **Read the book.** Each unit has more information than I can reasonably cover in lecture. The textbook is your primary source of information, and any information in the assigned reading is fair game for exams. I strongly suggest reading the chapter twice – once before the corresponding lectures, so that you can follow the key points in the lecture, and then once again afterwards, so that all of the details have a chance to sink in. Work the in-text problems as you go. I'm not about memorization, but you will need to understand key concepts and patterns of reactivity or you will struggle in my course.

4. **Come to lecture and discussion sections.** The purpose of lecture is to highlight the most important material in each unit, to help you organize the information in a way that's logical and easy to remember, and to show how certain important themes run throughout the entire course. From a completely GPA-centric point of view, it makes sense to come to lecture because it helps identify what I think is most important to know, which is likely also to be what I focus on when writing exams. It's also your best opportunity to ask me questions about the material and the structure of the course. The discussion sections are designed to go into more practical detail about the content of the lecture. Your TAs have a good idea of what is expected to do well in the course and will push you at the level that is necessary to succeed.

5. **Take good notes and copy them over.** The key to managing all of this information is to organize it well in your head. The book presents the material in a way that makes sense to the author; I'll present it in a way that makes sense to me. But your brain is likely to work in a

different way. It's a really good idea to take notes on your reading, take notes in lecture, and re-organize them into a master set of notes that works for you.

6. **Study in groups.** Studying with your friends makes studying seem less like a chore and more like a social occasion, and it'll help you keep up with the class. It's also a great way to identify the material that's the trickiest to grasp, so that you can ask better questions during lectures and office hours.

VIII. ADDITIONAL HELP

In addition to TA and my office hours, there are a couple of other places where you can find additional assistance.

- The Organic TA Office is in room B317. There is a schedule posted outside the door of various TAs and when they will be available to help you. Feel free to ask any of them for help, even if they are not a TA for Chem 345.
- The Chemistry Learning Center (CLC) is an invitation-only group that strives to help students that are struggling in the course. If you qualify, you should receive an e-mail from a CLC coordinator inviting you to participate.
- Alpha Chi Sigma Chemistry Fraternity has offered tutoring for chemistry classes in the past. Please contact them about their current help sessions.
- GUTS offers tutors as well. They can be contacted at:
  Student Activity Center
  Office #4413
  333 E Campus Mall
  Madison, WI 53715-1380
  Phone: 608-263-5666
  E-mail: guts@rso.wisc.edu
  http://guts.studentorg.wisc.edu/
- Drop-in tutoring through the College of Engineering's Undergraduate Learning Center is free and open to any student enrolled in a course covered by our program. Drop-in is available Sunday-Thursday, 6:30-9:00pm on the 3rd floor of Wendt Commons. Typically, Chem 345 is offered every day. For more information and a drop-in schedule, see: http://ulc.engr.wisc.edu.
- PLA groups.
- Study groups that were set up early in the semester.