Intermediate Organic Chemistry (CHEM 345)

Spring 2020

The Chemistry 345 - Lecture 3 is being taught as a stand-alone course this term. This syllabus only applies to Lecture 3.

Lecture 3 is held at 2:25 AM in Educational Science Building, Room 204

Instructor - Contact Information and Office Hours

Professor Andrew Buller

Office: Room 5114A Chemistry

Office Phone: 608-262-8431

Office Hours: Mon. 4:30-5:30 PM and Thurs. 2:15-3:15 PM in Rm 5114A.

Email: arbuller@wisc.edu

TA Office Hours: You are encouraged to attend the office hours of any/all of the organic chemistry TAs, which are held in B317 Chem (Organic Chemistry TA Office). ***Note: Piazza*** *is an online resource being used this semester to answer content questions in as efficient a manner as possible. Please feel free to utilize this resource in addition to going to office hours.*

Lydia Perkins: Mon. 5:40 – 6:45 PM and Tue. 5:40 – 6:45 PM;
ljperkins@wisc.edu
Allwin McDonald: Mon. 3:30 – 5:40 PM;
admcdonald2@wisc.edu

Office hours for all of the organic TAs can be found at the following link:
https://www.chem.wisc.edu/deptfiles/OrgLab/handouts/Organic_TA_Office_Hours_Spring_2020.pdf

Course Learning Outcomes

Students who are successful in this course will be able to:

1) Determine the structure of organic compounds using information from mass spectrometry, infrared spectroscopy, and nuclear magnetic resonance.

2) Use structural information to evaluate reaction mechanisms.

3) Identify reactivity trends for aromatic and conjugated molecules, with special emphasis on carbonyl compounds.

4) Apply known reactions in the retrosynthesis of a complex molecule (one that bears multiple functional groups).

5) Apply your knowledge of structure and reactivity to propose mechanisms for new transformations.

6) Identify situations outside of an instructional setting where organic chemistry is important.

Brief thoughts on being successful in organic chemistry

1. Practice, practice, practice. As each of you likely experienced in your first semester of organic chemistry, the work that it takes to do well with this subject is different from most other science classes. You can read the book cover to cover and memorize all of the equations, but you will only start deep learning once you take out pen and paper and *start working problems for yourself*. It is important to be able to solve problems that are in a new or unfamiliar format by translating it into one that you do recognize. This is a fundamental part of the practice of problem solving.

2. Read the book. There is a lot of material that I cannot cover in our class time. Also, we learn differently when we read compared to when we listen. I follow course material linearly within a chapter and recommend reading the material *before* class begins.

3. Don't fall behind! To succeed in this class, you will need to carve out sufficient time over several days during the week to work practice problems, read the book, and discuss with your peers. There is simply no substitute for this experience. Cramming simply does not work for this subject.

4. 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.

Developing mastery over any subject is deeply gratifying. Organic chemistry is a major scientific discipline in its own right and informs the basis for much of pharmacology, materials science, biochemistry, nutritional sciences and modern chemical biology. I invite each of you find your own motivation to learn this subject.

Additional Course Information

Canvas Course URL: https://canvas.wisc.edu/courses/125606

Course Designations: Intermediate level; physical science breadth; counts as L&S credit

Instructional mode: face-to-face

Credit Justification: This is a 3-credit class that meets for three 50-minute class periods each week over the Spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about two hours out of the classroom for every class period. This syllabus includes additional information about meeting times and expectations for student work.

Official 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.

Requisite: Grade of C or better in CHEM 343

Accommodations for Students with Disabilities

McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [Prof. Buller] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [Prof. Buller], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA."
http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

Discussion Meetings

The discussion sections will play many roles that will deepen your understanding of the course material. You will have a chance to talk to your TA and classmates about problem solving strategies, difficult course concepts, and common misconceptions. Discussion sections will often involve group work in some form or another. *You will not be passively listening to your TA talk about chemistry*. Furthermore, your TA's are highly successful organic chemists. This means that they can point out common issues that students struggle with and help you avoid them. They can provide you with learning insights that worked for them and they can help you interpret the textbook and lecture materials in a fairly sophisticated manner. Get the most out of each discussion by showing up ready to work and ready to discuss the week's material.

Diversity, Equity, and Inclusion are important throughout campus life, and these principles are particularly immediate in a discussion class. It is worth re-reading and reflecting on the official UW statement:

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

Textbook Reading

It is quite difficult for most students to understand the course material at the depth needed for a high-level of success without reading and working problems from the textbook. Loudon's organic textbook (6th edition) is an excellent book, with clear explanations and interesting practice problems. I recommend reading each chapter before lecture. A thorough reading of the textbook on any topic you are struggling with is critical. The explanations and examples provided will be helpful to your mastery of the material. It will provide more depth and breadth to the course material than I can provide in lecture and is an essential tool. Successful students will routinely work the in-text problems on a near-daily basis.

Email / Piazza

Emails to Prof. Buller should be limited to logistical information and any non-content related course questions. In order to help bring attention to your email, please include Chem 345 in the subject line of all emails you send me. *Content questions should be posted to Piazza*, an online resource where you can post questions, post answers to other students' questions, and receive answers to your questions from the TAs and Prof. Buller. Content questions received via email will be directed to Piazza**.** Please remember to be very clear when wording your questions. Pictures of structures from ChemDraw are very helpful. ChemDraw is an expensive piece of chemistry software that you have free access to. It is a high-quality chemistry drawing program that you can download (see below) and it will allow you to draw structures to accompany your questions. Pictures or scanned images are also okay on Piazza, but you will likely find ChemDraw easy to use to make high-quality organic chemistry drawings. Piazza can be accessed from within Canvas by the link on the sidebar.

Problem Sets, Textbook Practice Problems, Previous Quizzes/Exams

One of the best ways to make sure you are learning at the right depth and pace is to complete the practice problems available. In doing so, you will transfer what you know to new molecules and new structures, which will identify gaps in your knowledge and understanding. Answer keys are available for the problem sets and textbook, use these to check your learning. Answer keys are intentionally not provided to some of the previous quizzes/exams. This is done to encourage you to talk to your classmates and instructors about any answers that you are unsure of and to work through problems that you can't simply look up the answer to and shortcut your learning process.

Classmates

Nothing reveals your misconceptions and misunderstandings regarding organic chemistry faster than trying to explain something in words. If you are working with one or more classmates on a regular basis, you will benefit from the opportunity to talk about organic chemistry. If you don’t know anyone at the start of class, the discussion sections and office hours with Prof. Buller are a great way to meet other folks from the class and partner-up to study. Further, helping others with the material is a great way to take your own learning of a concept from superficial to mastery.

Tutors

The Department of Chemistry maintains a list of private tutors available for hire. Although the private tutors included on the list have been affiliated with the department in some way, we provide this list as a resource and cannot guarantee the quality of any individual private tutor.

Grading and Grading Philosophy

There are 570 points available in this course. There will be five graded homework assignments that will be assigned on a Wednesday and due in class the following Friday. Group work is encouraged. There are three 100-point exams. The final will be worth 200 points. No points will be awarded for the discussion problem sets or attending class. *No make-up exams will be given* barring a University-approved absence. Instead, we will automatically drop the lowest 100-point exam score and replace it with ½ the final exam score. The final letter grades based upon the total course points and are *anticipated* to reflect the historic averages of Chem 345 with a course GPA near 2.8.

4 x 10 pts + 1 x 30 Homework. Dates on course schedule (at end of syllabus)

100 pts. Exam 1 – Monday, February 17th, 2020

100 pts. Exam 2 – Wednesday, March 11th, 2020

100 pts. Exam 3 – Wednesday, April 15th, 2020

200 pts. Final Exam – Monday, May 4th, 2020

Exams will be given during regular class periods.

There will be no make-up exams except for University-approved absences.

Grading Philosophy

First, understand that I (Prof. Buller), do not have a desired grade distribution. It is my sincere, if slightly quixotic, hope that each of you demonstrates the mastery of organic chemistry necessary to receive an A. That being said, I endeavor to write exams that challenge students at all levels of learning and provide a wide grade distribution. My goal is to make these exams a challenging and interesting forum to demonstrate your critical thinking skills and knowledge of organic chemistry. The ideal outcome for each examination is for no one to achieve a perfect score, at least one student to provide a perfect answer to each question, and everyone to demonstrate the learning that they have achieved. The result is that I aim to write exams with a median score of 65/100. This would roughly correspond to a low ‘B’. Because each topic we discuss builds on the prior concepts, the significant weighting of the final exam favors students who have improved in their understanding and preparation as the course progresses, and is the basis for the policy of dropping the lowest midterm score and replacing it with ½ of the final. Your Tas and I strive to distinguish those who are trying to memorize patterns or use mnemonic

devices from those who understand the content in terms of reactivity, structures, molecular orbitals, pKa's, etc.

While the historic GPA for CHEM 345 is around 2.8, I am prepared for this course to meet and exceed this standard. The only scenario where grades deviate from a roughly normal distribution is in the event of a truly exceptional lecture section. Given the large population sampled, this is anticipated to be a fairly rare occurrence. But if *all* of you do an amazing job of learning (and we do a sufficient job teaching), the grades will absolutely be shifted to reflect your accomplishment.

Re-grades

We anticipate many emails about grades, with some even suggesting that a better grade is desired than was assigned. Some emails may contain a significant misconception about how grading is supposed to work. Grading in this lecture of Chem 345 is not about any of the following, which are *not* considered as rationale for wanting/deserving a better grade than what you have earned:

1. Effort/Hard work
2. Attitude toward organic chemistry
3. Attendance of office hours, lecture, or discussion
4. How much your TA or Prof. Buller seemed to like/dislike you
5. Needing a better grade for {insert school type here} school admissions
6. Wanting to take a course for which Chem 345 is a prerequisite
7. Needing a minimal grade to maintain scholarship status
8. Needing course credit towards graduation

In the event that a re-grade is warranted due to a mistake on the part of the grader, please be aware that the entire exam will be re-graded and it is entirely possible that resulting score could go up *or down*.

It would be wonderful for each student to achieve true mastery of organic chemistry. In practice, this seems to not occur and, unfortunately, instructors and students have helped create a general state of confusion about how grades are assigned. *No official grades will be issued for any exam prior to the final Course grade*. Why? Setting a certain % grade for an A/B/C is entirely artificial. The material is cumulative, the mean and standard deviation will vary significantly from exam to exam, and there is no universal standard (such as 75 % = B) that should be attained for a particular grade. *Do not attempt to use percentage scores to estimate your current or projected course grade**.***

Academic Misconduct

Folks, please don't cheat. Cheating is bad. Cheating is sad.

Dealing with academic misconduct is the most painful, annoying, and frustrating part of teaching. Historically in Chem 343/345, penalties have ranged from a zero on the related-work and a letter on file with the Dean of Students office to failure/removal from the course with larger UW Dean's office penalties. Out of respect, for yourselves, each other, and your instructors please behave in an appropriate manner with regards to all of the assessments.

Click here for access to the UW-Madison Dean of Students Office - Academic Integrity

From past experience, the two most common forms of academic misconduct in this course are related to re-grades and sharing information about exams. Here are some general thoughts and suggestions on the topic... (no particular organization or forethought)

1) Do not talk to people about any exam until after the key is posted.

2) Do not turn in work or thoughts that aren't your own.

3) Looking at someone else's exam, or notes you brought in during an exam is cheating.

4) If it feels like you might be doing something icky and dishonest, you may well be! Try doing something else instead.

5) Do not change your answers on your exam and ask for a re-grade. You might think we are stupid and we might be... but we're not that *stupid.*

6) When you come to the exam, sit far enough away from anyone else and in a posture that no proctor can think you are cheating. Make sure all your stuff is in airplane mode, like your phones, computers, purses, backpacks, etc... If all your stuff is put away, shut down, zipped up, and not connected to the internet, so no one can think you're trying to cheat.

7) Cheating to gain a few points is not worth the repercussions.

Recommended and Required Course Materials

Required:

Organic Chemistry 6th (or 5th) edition by Marc Loudon

Recommended:

Solution Manual Organic Chemistry 6th (or 5th) edition

Molecular Model Kit

Several model kits are available online, at the UW Bookstore, and from AXΣ in the Mills Street Atrium of the Chemistry Building. It is not important which model kit you acquire, none of them are perfect and all are helpful.

ChemDraw (ChemDraw 15 Download Instructions)

As a UW student, you get ChemDraw15 free! This is pretty awesome! We highly recommend downloading the software and using it whenever you are posting on Piazza. It is the same software that we use to draw all of the molecules for your problem sets, quizzes, and exams.

This syllabus draws extensively (and occasionally word-for-word) from the Chem343 syllabus written by Dr. Brian Esselman and Chem345 syllabus written by Prof. Tehshik Yoon.

Approximate Course Schedule (Exam Dates Are Fixed)

Class #	Date	Day	
1	22-Jan	Wed	Syllabus and Ch16
2	24-Jan	Fri	Ch16
3	27-Jan	Mon	Ch16
4	29-Jan	Wed	Ch17
5	31-Jan	Fri	Ch17
6	3-Feb	Mon	Ch18
7	5-Feb	Wed	Ch18 **HW 1 assigned**
8	7-Feb	Fri	Ch18 **HW 1 due**
9	10-Feb	Mon	Ch12 – Guest Lecturer!
10	12-Feb	Wed	Ch12 & Ch 13 – Guest Lecturer!
11	14-Feb	Fri	Flex & In-Class Review Day
12	17-Feb	Mon	Exam #1 (Covering Ch16-18)
13	19-Feb	Wed	Ch13
14	21-Feb	Fri	Ch13
15	24-Feb	Mon	Ch19
16	26-Feb	Wed	Ch19 **HW 2 assigned**
17	28-Feb	Fri	Ch19 **HW 2 due**
18	2-Mar	Mon	Ch19
19	4-Mar	Wed	Ch19
20	6-Mar	Fri	Ch19
21	9-Mar	Mon	Flex & In-Class Review Day
22	11-Mar	Wed	EXAM #2 (Covering Ch12, 13, 19)
23	13-Mar	Fri	Ch20
---	16-Mar	Mon	Spring Break
---	18-Mar	Wed	Spring Break
---	20-Mar	Fri	Spring Break
24	23-Mar	Mon	Ch20
25	25-Mar	Wed	Ch21 **HW 3 assigned**
26	27-Mar	Fri	Ch21 **HW 3 due**
27	30-Mar	Mon	Ch 21 + Flex
28	1-Apr	Wed	Ch22
29	3-Apr	Fri	Ch22
30	6-Apr	Mon	Ch22
31	8-Apr	Wed	Ch22 **HW 4 assigned**
32	10-Apr	Fri	Ch22 **HW 4 due**
33	13-Apr	Mon	Ch22
34	15-Apr	Wed	EXAM #3 (Covering Ch20-22)
35	17-Apr	Fri	Ch23
36	20-Apr	Mon	Ch23
37	22-Apr	Wed	Ch23
38	24-Apr	Fri	Flex time; **HW 5 assigned**
39	27-Apr	Mon	Flex time
40	29-Apr	Wed	Flex time; **HW 5 due**
41	1-May	Fri	Course Evaluations, Reflections, Careers
42	4-May	Mon	FINAL EXAM