# Chemistry 343 Syllabus

**Instructor - Contact Information and Office Hours**

Instructor: Dr. Brian J. Esselman
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Office hours: Monday 4:35 pm - 5:40 pm, Tuesday 6:30 pm - 8:00 pm, Thursday 1:20 pm - 2:25 pm. My office hours are combined CHEM 343/344/345. Note, that my Tuesday evening office hour will only be held when Chem 344 has lab sessions in the evening. Check the Chem 344 schedule (https://www.chem.wisc.edu/content/chemistry-344) or contact me to confirm.

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.

**Teaching Assistant - Contact Information and Office Hours**

Moira Esson (messon@chem.wisc.edu): Fridays 8:50-10:55
Shane Lies (slies@wisc.edu): Tuesdays 5:40-6:40 and Wednesdays 5:40-6:40
Organic Division TA Office Hours (B317, Attend as often as you need.)

# Organic Chemistry Teaching Assistants
# Office Hours Room B317
# Fall 2015

| Time | Mon | Tues | Wed | Thurs | Fri |
|---|---|---|---|---|---|
| **8:50 AM** | Nels Gerstner<br>Evan Sherbrook | Jordan Ho<br>Brian Graham | Nels Gerstner<br>Naomi Biok | Jordan Ho<br>Minxue Huang | Moira Esson<br>Lin Hui Chang |
| **9:55 AM** | Eileen Burke<br>Evan Sherbrook | Jiale Du<br>Gary Wilson | Julie Alderson | Kirandeep Deol<br>Michael Croisant | Moira Esson<br>Lin Hui Chang |
| **11:00 AM** | Eileen Burke<br>Andrew Maza | Nels Gerstner<br>Andrew Maza | Julie Alderson<br>James Chambers | Vanessa Orr | Caitlin Kozack<br>Niecia Flikweert |
| **12:05 PM** | Nolan Blythe<br>Lindsey Orgren | Andrew Maza<br>Nicholas Walters | Michelle Fleetwood<br>Aris Vasilopoulos | Nicholas Walters<br>Minxue Huang | Michelle Fleetwood |
| **1:20 PM** | Minsoo Ju | Nicholas Walters<br>Hunter Lau | James Jirak | Minxue Huang | Allice Dang<br>Nicholas Reed |
| **2:25 PM** | Nolan Blythe | Charnell Long<br>Cara Schwarz | James Jirak | Lu Liu<br>Zebediah Girvin | Chris Gravatt |
| **3:30 PM** | James Jirak<br>Jordan Buhle | | Josh Corbin | Lu Liu<br>Daniel Manson | Jordan Ho |
| **4:35 PM** | Ryan Scamp<br>Ryan Reeves | Ryan Scamp | Maria Zdanovskaia | Charnell Long<br>Rowan Littlefield | |
| **5:40 PM** | Ryan Scamp | Shane Lies<br>Byung Joo Lee | Shane Lies<br>Kirandeep Deol | Austin Kruger<br>Craig Jones | |

CHEM 341/342
CHEM 343 TA
CHEM 344 TA
CHEM 345 TA

**Course Schedule – Chemistry 343 Lecture 3**

| *Monday* | *Wednesday* | *Friday* | *Discussion* |
|---|---|---|---|
| | **Sept 2**<br>Chapter 1<br>Bonding and Structure | **Sept 4**<br>Chapter 1<br>Bonding and Structure | Problem Set 1 |
| **Sept 7**<br>Labor Day | **Sept 9 ***<br>Chapter 2<br>Alkanes | **Sept 11**<br>Chapter 2<br>Alkanes | Problem Set 2<br>**Quiz 1** |
| **Sept 14**<br>Chapter 3<br>Acids and Bases | **Sept 16**<br>Chapter 3<br>Acids and Bases | **Sept 18**<br>Chapter 3<br>Acids and Bases | Problem Set 3 |
| **Sept 21**<br>Chapter 4<br>Alkenes | **Sept 23**<br>Chapter 4<br>Alkenes | **Sept 25 ****<br>Chapter 4<br>Alkenes | Problem Set 4 & Exam Review 1 |
| **Sept 28**<br>Review for Exam 1<br>**Exam 1 5:45 – 7:15 pm** | **Sept 30**<br>Chapter 5<br>Addition Reactions of Alkenes | **Oct 2**<br>Chapter 5<br>Addition Reactions of Alkenes | Problem Set 5 |
| **Oct 5**<br>Chapter 5<br>Addition Reactions of Alkenes | **Oct 7**<br>Chapter 6<br>Principles of Stereochemistry | **Oct 9**<br>Chapter 6<br>Principles of Stereochemistry | Problem Set 6 |
| **Oct 12**<br>Chapter 6<br>Principles of Stereochemistry | **Oct 14**<br>Chapter 7<br>Cyclic Compounds and Stereochemistry of Reactions | **Oct 16**<br>Chapter 7<br>Cyclic Compounds and Stereochemistry of Reactions | Problem Set 7<br>**Quiz 2** |
| **Oct 19**<br>Chapter 7<br>Cyclic Compounds and Stereochemistry of Reactions | **Oct 21**<br>Chapter 8<br>Introduction to Alkyl Halides, Alcohols, Ethers, Thiols, and Sulfides | **Oct 23**<br>Chapter 8<br>Introduction to Alkyl Halides, Alcohols, Ethers, Thiols, and Sulfides | Problem Set 8 & Exam Review 2 |
| **Oct 26**<br>Review for Exam 2<br>**Exam 2 5:45 – 7:15 pm** | **Oct 28**<br>Chapter 9<br>Chemistry of Alkyl Halides | **Oct 30 †**<br>Chapter 9<br>Chemistry of Alkyl Halides | Problem Set 9 |

| | | | |
|---|---|---|---|
| **Nov 2**<br>Chapter 9<br>Chemistry of Alkyl Halides | **Nov 4**<br>Chapter 9<br>Chemistry of Alkyl Halides | **Nov 6**<br>Chapter 10<br>Chemistry of Alcohols and Thiols | Problem Set 10 |
| **Nov 9**<br>Chapter 10<br>Chemistry of Alcohols and Thiols | **Nov 11**<br>Chapter 10<br>Chemistry of Alcohols and Thiols | **Nov 13**<br>Chapter 11<br>Chemistry of Ethers, Epoxides, Glycols, and Sulfides | Problem Set 11<br>**Quiz 3** |
| **Nov 16**<br>Chapter 11<br>Chemistry of Ethers, Epoxides, Glycols, and Sulfides | **Nov 18**<br>Chapter 11<br>Chemistry of Ethers, Epoxides, Glycols, and Sulfides | **Nov 20**<br>Chapter 14<br>Chemistry of Alkynes | Problem Set 14 & Exam Review 3 |
| **Nov 23**<br>Chapter 14<br>Chemistry of Alkynes | **Nov 25**<br>Chapter 14<br>Chemistry of Alkynes | **Nov 27**<br>**Thanksgiving Break** | **Thanksgiving Break** |
| **Nov 30**<br>Review for Exam 3<br>**Exam 3 5:45 – 7:15 pm** | **Dec 2**<br>Exam Prep and Review of Chapters 1 - 14 | **Dec 4**<br>Chapter 15<br>Dienes, Resonance, and Aromaticity | Problem Set 15 & Exam Review 4 |
| **Dec 7**<br>Chapter 15<br>Dienes, Resonance, and Aromaticity | **Dec 9**<br>Chapter 15<br>Dienes, Resonance, and Aromaticity | **Dec 11**<br>Chapter 15<br>Dienes, Resonance, and Aromaticity | Problem Set 15 & Exam Review 4<br>**Quiz 4** |
| **Dec 14**<br>Review for Final Exam | **Dec 16** | **Dec 19, SATURDAY**<br>**Final Exam**<br>**7:25 – 9:25 pm** | |

* Last day to drop courses or withdraw without notation on transcript.
**Last Day for 50% tuition adjustment on dropped classes.
†Last Day to Drop courses.

**Course schedule is subject to change.**

## Where the Learnin' Happens

### Philosophy

To quote one of my best teachers, "All real learnin' is painful." He was a football coach which might have shaped his outlook on teaching and learning chemistry. Over the years, however, I have found a lot of truth in his statement. In challenging learning environments or courses that have high expectations, mastery of the material has required a lot of effort, a lot of toil, a lot of time and a fair amount of pain. Learning is not free and sadly is not available Matrix-style. To move from familiarity to understanding and mastery, in organic chemistry, is going to require a great deal of focus and effort. I promise that by the end of chemistry 343/344/345, you will be a more mature learner, a stronger thinker, and have a much better understanding of chemistry.

**Each phase of learning below is important for your success. Do not overlook any of them.**

### Lecture

The purpose of lecture is to provide a conceptual framework for you to understand the course material. Key concepts and examples will be highlighted. While many details will be discussed, the focus will be on the big concepts and how the current material connects to past learning and future expectations. Lectures will help define the depth and breadth of the course and will help you understand the course expectations. I will try to always be available in the lecture hall before and after lecture for questions. I cannont cover all of the course material at a sufficient depth in lecture alone. You will need to supplement lecture with study groups, discussion attendance, and textbook reading.

Lecture videos will be made and posted on Learn@UW in as timely a manner as possible. These are recorded with high definition video and audio and capture exactly what I'm presenting in lecture. There is no guarantee that these will be available for all lectures and as quickly as you'd like. Attending lecture is still advised. Please be patient as the rendering and uploading of 6+ GB video files is not instantaneous.

### Discussion

The discussion sections with your TA are critical as part of your learning process. The discussions play many roles all of which serve to deepen your understanding of the course material. You will have a chance to talk to your TA about problem solving strategies, difficult course concepts, and address common misconceptions. Discussion provides a great opportunity to talk about the material. You will learn a lot more if you are engaged in conversations about course content than if your only studying is hiding in cage in depths of the Memorial Library Stacks. 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 it by showing up, ready to discuss the week's material.

### 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 the textbook. Loudon's organic textbook is a great book chosen for its

clear explanation and great practice problems. I recommend reading each chapter before lecture or immediately following. 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 should not be over-looked as a valuable tool. I highly recommend working the in-text problems as you go.

**Office Hours**

Your TAs and I are highly concerned about your learning. Unfortunately, there are 250+ of you and we can't reach out to each of you individually and make sure that you are having the success that you are looking for. That's where the office hours come in. In the past, the most successful students took good advantage of office hours on a weekly basis. They came with lists of questions and clearly identified problems that they needed help solving. This lead to great discussions and a very effective use of time.

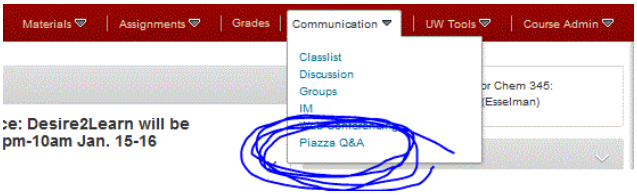
Your TAs will be holding office hours and you are highly encouraged to attend and get some one-on-one and small group help with the problem sets and previous exams. Additionally, the Organic Chem TA office that will be staffed most of the day with TAs of Chem 341/342/343/344/345/346 ready to answer your questions. Feel free to go as often as you like.

**Email**

I get a lot of emails, and I lose them in my inbox more than I'd like. In order to help bring your email to my attention, please include Chem 343/344/345 in the subject line of all emails you send me. Email should be limited to logisitical, concerns about grades, requests for alternate office hours, or any non-content related course questions. This semester, we are using Piazza (see below) to manage content-related questions. This is great for you as it allows you to get your science-related questions answered by another student, any of 3 TAs and/or myself. This helps to ensure that you'll get a timely response to your question.

**Piazza**

Content questions should be directed to Piazza and not sent via email to either the TAs or myself. Content questions received via email will be directed to Piazza. Piazza is a great online resource where you can post questions, post answers to other students' questions, and receive answers to your questions from the TAs and myself. Please remember to be very clear when wording your questions on Piazza. Pictures of structures from ChemDraw are very helpful. Chemdraw is an expensive piece of chemistry software that you have free access. 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 Learn@UW by the link shown below.



**Chemdraw**

To download Chemdraw please follow these instructions:
http://comphelp.chem.wisc.edu/content/downloading-chemdraw-15

**Problem Sets, Textbook practice problems, Previous Exams**

The only way to make sure you are learning at the right depth and pace is to complete the practice problems available. If you cannot transfer what you know to new molecules or new structures, it identifies a gap in your knowledge and understanding. Answer keys are provided to 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 the thinking/learning process.

**Classmates**

Nothing reveals your misconceptions and misunderstandings regarding organic chemistry than trying to explain something in words. If you are working with one or more classmates on a regular basis, both of you will benefit from the opportunity to talk about organic chemistry. Helping others through material is a great way to take your own learning of a concept from superficial to mastery.

Additionally, there are plenty of other resources from the UW-PLA, free turoing options, and paid tutoring options. Most importantly, find a way to master the material and have success.

## Grading & Grading Philosophy

**Chemistry 343 Grading**

There are 600 points available in this course. There are four 25 pt quizzes, three 100 pt exams, and one 200 point final. No points will be awarded for the problem sets or attending class. No exams or quizzes will be dropped; you must take them all at the regularly scheduled time unless you have a university course conflict. All points have equal value. The final letter grades based upon 600 course points will reflect the historic averages of Chem 343 with a course GPA near 2.74.

25 pts. Quiz 1 Discussion
**100 pts. Exam 1**
25 pts. Quiz 2 Discussion
**100 pts. Exam 2**
25 pts. Quiz 3 Discussion
**100 pts. Exam 3**
25 pts. Quiz 4 Discussion
**200 pts. Final Exam**
(There are NO makeup quizzes. You must attend discussion on the dates of the quizzes.)

**Grading Philosophy**

Grades are important to you, to me, and to the university and grade assignments must reflect acheivement and learning. How that is measured and what acheivement looks like are issues that are up for debate and are subject-dependent. I consider the exams and quizzes in this course to be reasonable markers of acheivement and learning. Certainly, there are better/alternate methods for assessing student learning, though none of which seem overly practical in a course that serves 200 - 350 students per term. The final exam counts for 200 of 600 course points weighting it double the other exams or the quiz total. This favors students who have improved in their understanding and preparation as the course progresses. I endeavor to write exams that challenge students at all levels of learning and provide a wide grade distribution. My goal is to have no one be perfect on the entire exam, at least one student provide a perfect answer to each question, and everyone demonstrate the learning that they have achieved. I will always try to separate those that are trying to memorize patterns or use mneumonic devices from those who understand the content in terms of reactivity, structures, molecular orbitals, pKa's, etc.

Every semester, I get a lot of emails about grades, many of them suggesting that a better grade is desired than was assigned. Often these emails include a significant misconception, in my mind, about how grading is supposed to work. Grading in my lecture of Chem 343/345 is not about any of the following and 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 I like/dislike you
5) Needing a better grade for {insert school type here} school admissions
6) Wanting to take a course for which Chem 343/345 are prerequisites

Unfortunately, instructors and students have helped create a general state of confusion about how grades are assigned, generally. Setting a certain % grade for an A/B/C is entirely artificial and is based upon a few assumptions. Firstly, it assumes that all assignments are of equal difficulty and can be compared directly. This is certainly not the case in this course as the mean and standard deviation vary significantly from assignment to assignment. Secondly, it assumes that there is some universal standard (such as 80 % = B) that should be attained for a particular grade. Furthermore, without intervention it often creates grade distributions in difficult classes with GPA's that are much lower than desired or reasonable. This forces odd adjustments to be made to scores to make them *fit* with the instructor's desired grade distribution. This seems artificial and doesn't help students gauge their performance in light of mysterious adjustments. (Often times, people misuse the word *curve* here to mean a positive adjustment in everyone's score.)

A much simpler approach is to allow the scores to fall where they do from assessment to assessment and to determine each grade relative to the mean in units of standard deviation. This is an imperfect approach, but far more instructive than simply looking at raw scores or % scores without considering the mean and standard deviation. In order to do this, simply use the formula below and apply an actual (simple) curve.

**normalized score = (your score - average score)/(standard deviation)**

If your score is +1, you rocked that assessment! If your score is near zero, you have achieved an average grade on that assignment (~ BC in Chem 343/345). If you have a score of -1, your achievement is not where it needs to be. This information will be added to the title of each quiz or exam once the information is available.

## Academic Misconduct

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

Dealing with academic misconduct is the most painful/sad/annoying part of my job. 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. The TAs and I had to deal with two cases of academic misconduct last year and it was pretty unpleasant and heartbreaking all around. Out of respect, for yourselves, each other, and your instructors please behave in an appropriate manner with regards to all of the assessments.

UW Dean of Students Office - Academic Integrity

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

1) Do not talk to people about the quiz if they haven't taken the quiz.

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 or whaterver is bad, very bad.

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 I'm stupid and I might be... but I'm not that stupid.

6) When you come to the exam or quiz, sit far enough away from anyone else and in a posture that no proctor can think you are cheating. Make sure all of 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) In the words of one of your classmates from a previous semester about sharing exam related information, "It wouldn't be moral and since this class is curved, revealing knowledge of the exam wouldn't be beneficial to my grade either."

8) Cheating to gain a few points is not worth the possible repercussions. I'm sure of it. I've checked.

**Recommended and Required Course Materials**

**Required:**

Organic Chemistry 6th edition by Marc Loudon

**Recommended:**

Solution Manual Organic Chemistry 6th edition
(Additional solutions not in the Solution Manual are posted on Learn@UW)
Sapling Learning
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. (I like one of the more expensive one simply for the nice snap/pop sound it makes when in use.)

ChemDraw (ChemDraw 15 Download Instructions)

As a UW student, you get ChemDraw free! This is pretty awesome! I highly recommend downloading the software and using it whenever you are sending an email question to a classmate, myself, or a TA. It is the same software that we use to draw all of the molecules for your problem sets, quizzes, and exams.

## Student Tips for Success in Organic Chemistry

**Introduction**

I polled the top 10 students from my previous Chem 343/345 courses and asked them to provide their advice for how to succeed in organic chemistry. Here are their un-filtered responses (I really wanted to edit some of them, but I resisted the temptation). I hope that you can use their tips and suggestions to improve your chances for success in this and other courses. I've ordered them from the shortest to the most verbose. You will see that there methods varied slightly by their advice. They are in agreement, however, on how much committment and effort these courses require. This is a group of very intelligent individuals, but they likely have some suggestion that could benefit everyone taking a challenging course. Comments that I think are particularly insightful for all students have been highlighted.

**Student 1 (Fall 2013):**

I succeeded in Chem 343 because I put a lot of time and effort into studying. **I read over each chapter after lecture and I did every problem set and practice exam. I found office hours helpful as you can talk to TAs individually and work in groups.** The exams reflect the major points of the lectures so its important to attend each one. I usually spent three nights a week studying chemistry. I would read the book one night, do the problem set the next night, and review/do book problems the third night.

**Student 2 (Fall 2013):**

What really got me through this class was **in the first month and a half of the course, I spent about 1-2 hours per day obtaining a fundamental understanding of each reaction we learned**. By doing and re-doing the problem sets/book problems, staring at molecular model sets, and asking a lot of questions to the TA's and professor, the following months seemed to flow with relative ease.

Just put in the time at the beginning of class to obtain a fundamental understanding [the 'why'; not the 'how] of organic chemistry and have fun learning for the rest of the semester! [Small tip: do a few problems from the upcoming problem set to study for the exam or quizzes :)]

**Student 3 (2012/2013):**

I had success in this course by focusing almost entirely on the problem sets and lecture notes. I only used the book when I had a hard time grasping an essential concept. **I also tried to learn why every reaction from the problem sets happened and didn't memorize a reaction unless we did not learn the mechanism.** I think most of my success came from doing the problems sets right after the material was learned in lecture rather than right before the test. I found that the harder concepts were more easily grasped by doing this.

**Student 4 (2012/2013):**

1) **Doing every problem set to full understanding - meaning not just copying your notes but actually knowing what is happening in each question.**

2) **Knowing why instead of what** - I feel like a lot of my friends that took the class simply tried to memorize every reaction and what the product would be. Based on what other people told me prior to taking the class I'd gather they had the same process. However, I think that knowing why each reaction takes place makes the class 100000 times easier. It takes almost all the memorization out of it and turns it into knowing a few simple concepts that apply to nearly all the mechanisms.

**Student 5 (2012/2013):**

I worked on organic chemistry every day for at least an hour. Most of my studying was independent, but occasionally I studied with a few other students and attended office hours when needed (which were always helpful). **The textbook was helpful for some of the reaction-heavy chapters**, but otherwise not very useful. The problem sets are a great indicator of the format and style of quizzes and exams, and understanding those is most important. Additionally, lecture notes are great for reviewing concepts. **The key to success in organic chemistry is understanding how and why things occur, rather than mere memorization.** I found it very helpful to formulate a study guide containing all of the reactions, mechanisms, and notes pertaining to key ideas.

**Student 6 (2012/2013):**

**My first piece of advice to organic chemistry students is to take the quizzes seriously.** They provide a great opportunity to see if you really know the material before taking the exams. Additionally, if you really take them seriously, they force you to study the material early on instead of cramming the night before the exams. My second piece of advice is to really focus on the problem sets as they give a good indication of what will be on the quizzes and exams. Instead of waiting for the answer key to be posted, try to complete as much of the problem set as you can. Finally, I advise you to make flash cards. Even if you never use them to review before the final, just writing the reactions provides additional practice. Good luck!

**Student 7 (2012/2013)**:

**The best advice I can give is read the assigned text along with each lecture, take good notes during lectures/discussions, do the practice problems after reading the chapter, follow this up by doing as much of the problem set as you can, look over the answers to the problem set to try to work out the ones you get wrong, ask lots of questions when you have them, attend office hours (not many people go and this is where you can learn A LOT!), make note cards and most of all, try to enjoy it!**

**Student 8 (Fall 2013)**:

I would say that you absolutely MUST go to lecture and take good notes. It isn't the same to copy someone else's notes, you need to be there when he explains the concepts so that you really understand. Next, you definitely should do the problem sets. They are extensive and are a great way to help you practice all kinds of problems that could appear on the exams. Also, you should do the practice quizzes and exams. These are awesome because the exams and quizzes have basically the same format and types of questions, so there won't be any surprises. I always did these with a friend so we could compare answers since there were no answer keys posted. As for the textbook, I never opened it. I don't really get much from reading paragraphs about chemistry, I need someone to teach and explain it to me, which is why lecture is so

important. I also never did any textbook problems because I thought the problem sets and practice quizzes/exams were enough for studying the material.

**Student 9 (Fall 2013)**:

Go to all lectures. This will help you understand the topics introduced and how they fit into the "big picture" of the semester's material. Reinforce these concepts by reviewing the instructor's notes posted on Learn@UW, especially when preparing for quizzes and exams. **Work through the problem sets. These give you the "hands-on" knowledge of how to apply the theoretical concepts learned in lecture. In many cases, you may be surprised to find out that you did not fully understand a particular reaction or mechanism until working through a problem. The problem sets also illustrate broader applications and variations of each reaction/mechanism, which is how they are often presented on quizzes and exams. Read the book for additional clarification as needed.** In general, I found discussions (and discussion exercises) and office hours (especially when I was able to narrow down my list of confusing topics) very helpful. If you think about it, all of the materials needed to do well in this course are very conveniently made available for you on Learn@UW. Use these materials.

**Student 10 (Fall 2013)**:

The most important tip I can give with succeeding in o-chem is about learning techniques. **It is crucial not to memorize but to understand! Memorizing is time consuming and doesn't prepare you for solving different but similar problems you will see on the exams and final. When I refer to understanding, this means knowing 100% of the material!**

**The methods used in gaining this understanding required an enormous amount of work, but was well worth it in the end. The night before each lecture, I would pre-read the content and take notes. In other words, I would go through what was taught in class with great detail twice before I ever went to lecture! Then, when it came to lecture, the content was reinforced by the professor. At the end of each week, I would go through the problem sets, reviewing everything that I had learned. Any questions that I had based on the readings, lectures, or problem sets, were then asked and answered at my discussion.** This consistent and repetitive studying was made up for the cramming before big tests. Overall, I estimate that I spent 1.5 hours * 3 nights a week reading, and an hour a week for the problem sets (5.5 hours a week).

By the time it came to quizzes, exams, or finals, it was important to have completed and understood all of the problem sets up to that point. This was a great way to study and to predict the content on the graded material!

**Student 11 (Fall 2013)**:

Easily the most important thing for me was the problem sets. I made sure to do them every week and refrain from checking answers until i had completely finished. I focused most on understanding the concept behind each problem and trying to figure out what idea each problem was meant to reinforce. Besides this, I did relatively little to study. I did each practice exam before the day of the exam, and looked over some old quizzes beforehand as well. **I spent the majority of my study time making sure that I was able to understand the REASON for reactions and mechanism instead of grinding down excessive amounts of problems.** As a result of this I felt confident going into the tests because I knew I had the

ability to logically work through any application of the concepts I had studied, regardless of the substrate/treatment.

Otherwise, I did virtually nothing besides attend lecture. I never used office hours or met with a TA, never worked through book problems or met with other students to study, and as I had my discussion at 7:45 on fridays, I only attended to take quizzes. Even though these are all extremely helpful methods to reinforce material, I had no need to go through an excessive number of examples because I concentrated all my studying on understanding core concepts.

**Student 12 (2012/2013):**

1. It's not as scary as everyone makes it out to be. Don't freak out.

2. **It's not a class for which you can expect to memorize all the information in the class and succeed. Yes, you have to memorize a lot of reaction conditions, but that's not the key to the class. The key to success is understanding why/how things happen**, at least the reactions that we have mechanisms or theories for. Once you understand why things happen, the memorization is either much easier or not necessary at all. I had a lot of friends who'd ask me what the product of a reaction was, expecting me to be able to just pull the answer out of my head. I would just draw out the mechanism based on the reactivities we had learned, and that would be how I would get the final answer, instead of trying to just remember it. Understanding the why and how is important for reactions, and is more so for understanding the exceptions to reactions that are generally tricky to memorize. So I would say that my main advice is to learn and understand the coursework before trying to commit it to memory, or else the class will be just as hard as everyone says.

**Student 13 (2012/2013):**

**Although the lecture notes are placed online, I don't think it is a substitute for the information you get from attending lecture because everything comes together when you hear the explanations.** I would rewrite the lecture and discussion material, as well as the explanations for each, on flashcards. By the end of a unit I would have a considerable pile of flashcards which were used as a study guide for the exams as well as the final. I would go through my flashcards until I could explain, draw, or write out everything on the backside of each card without looking at it. **I personally think being able to explain why each problem or reaction happens is so vital to doing well in the class.** Although it may seem more time consuming, I think it actually saves you time in the long run and makes the class easier to tackle by understanding rather than memorizing. Prior to an exam or quiz I would also thoroughly do the problem sets multiple times until I understood/can explain everything on them. With doing all of this, I probably spent 4-7 days a week studying chemistry. I didn't really utilize office hours or other resources like PLA because they conflicted with my other classes; however, personally **I was able to find sufficient clarification from the book or from lecture.** At the beginning of the semester I attempted to persevere though each chapter in the textbook but I found it to not be necessary. Later in the semester, I just referenced the textbook to clarify concepts I didn't understand and then transferred portions onto flashcards as needed.

**Student 14 (2012/2013):**

On average I would say I spent around 3 days per week on organic chemistry, and generally it would be a day reading through the textbook, another day doing the given problem set for that week. The final day

was for either finishing the problem set or doing other problems in the textbook. I did almost all of my work alone, but at times I felt it would've been beneficial to work in groups if the topics were more difficult because then discussion could've produced a better understanding of the material. I also never attended office hours, but I attended all of the discussion sections and had my questions answered during that time.

My study plan for each chapter was to first read through the textbook, and this was usually after we had completed most of the chapter in lecture, so the textbook was used as a review of the lecture material. Then, I would complete the problem sets after the lecture notes and reading through the textbook. To study for quizzes and exams, I would review the lecture notes and redo the problem sets to prepare. I also found it very useful to make note cards because making the note cards was a good review of the material and they worked great for reviewing for the exams.

**The thing I found to be most helpful to having success in both 343 and 345 was learning the material in such a way that I could apply trends and the chemistry in different situations instead of attempting to memorize the chemistry. Organic Chemistry is a lot of information and there is no way any student could memorize and retain all of the material involved. I learned that to have success you really needed to know the chemistry and be able to apply it to different situations. The problem sets and the textbook really helped me actually understand the material and from that I could apply it to problems that involved different situations.**

One thing you hear a lot before you take O-Chem is how hard it is and how much work it is. One thing I wish I knew before is that the hard work definitely pays off in the end, and if you do put in the work you learn a lot, and for me it became one of my favorite courses.

**Student 15 (2012/2013):**

During the spring semester I would generally spend 4-6 days on organic chem, on some days I would spend as much as 4 hours and others as little as 30 minutes. But this includes time spent on my 344 class. If I had been just taking 345 I would definitely have had to spend much less time on organic. I generally worked and studied by myself. Whenever I had questions or was unclear about a topic I would go to Ben or ask Brian. I would read the textbook for each chapter, and have read most of the book. I feel that reading the textbook was helpful because it generally would go into detail explaining why certain things would happen. At times the text would seem a bit irrelevant, in relation to the course material, but having the in-depth knowledge definitely helped. Before exams and quizzes I would focus heavily on the problem sets, while glancing over the lecture notes and my textbook notes.

I definitely feel that the teaching style played a big part in my success. As I mentioned previously, learning why things happen and the reasoning behind chemistry is superior to learning *what* happens. The course is taught with this in mind, and did a great job explaining the theoretical aspect of many reactions. And in particular, I found how the course related different reactions to already understood reactions and concepts extremely helpful. For example, when you would demonstrate how some newly learned reactions were analogous to previous reactions, and how you related reactivity trends to stuff learned in 343 (sn2 rates, chem eq, etc). Also, it seemed to me that much of 344 dealt with acid-base eq, which seems to never go away and is definitely worth knowing. If I were to do it again I would focus a little more on the lecture notes when studying.

**Student 16 (2012/2013):**

Success in organic chemistry involves understanding concepts, considerable practice, and operating under the assumption that mastering the material is going to be time-consuming. With these basic axioms, one can succinctly approach the content without getting entirely overwhelmed—so long as adequate time is allotted.

I usually begin 'studying' by thoroughly reviewing lecture material. This first step hinges on taking comprehensive notes during lecture; this means you should be present and prepared to really engage your mind. Drink coffee if you have to. Using notes, I try to understand the underlying concepts and key points, not merely memorizing definitions and reactions. I found it helpful to go through my lecture notes and annotate them, like: *this happens because…, *important because…, etc. Additionally, I'd occasionally make in depth note sheets that synthesize key points/topics/reactions, also pulling useful material from the corresponding book chapter. Although I generally view textbooks as the bane of enjoyable learning, sometimes the book presents content in a manner that is more conducive to understanding or it clarifies a confusing topic—use it as a resource, albeit a dull one. In conjunction with note sheets, I'd re-transfer important information/reactions/definitions to flash cards so I could quiz myself. It's a tough life, being a nerd.

Once I was confident in my understanding, I would apply this knowledge to practice problems. Generally I'd begin with book problems, as they are simple and integrated within the text, and move into the more complex problem sets. I found it extremely useful to complete a whole set of problems (ex. a chapter in the book or an entire problem set), then immediately correct my own work. This was my way of identifying what I didn't understand and what I needed to practice more, so that when I did round two of practice problems I knew which problems to focus on. I spoiled it in the last sentence, but my penultimate step is to redo practice problems. By this time, if you can't do nearly all of the problems correctly without notes, cycle back to step one. Study, practice, repeat. Drink more coffee, if you must. Lastly, keep up with the material. Week-by-week, chapter-by-chapter, make sure to stay current with the content. Disregard my process if it doesn't suit you, but absolutely do not fall behind. If you are ready to devote a lot of time to this course and make it a priority, you can succeed without struggle. Embrace your inner nerd and nearest caffeine source, and get ready for a real good time.

**Student 17 (2012/2013):**

The days per week that I worked on organic varied with what was covered and what else was happening that week. On average, I studied about 30-40 hours/week studying. The time spent on learning the material significantly increased over the semester, so at the beginning probably only 20 or even 15 hours/week. This being said, I would advise students to take a light credit load if they can, especially if it is taken at the same time as biology 152, as is the case for myself and many pre-health students. I took 13 credits, my other classes being Immunology and a 2 credit Undergraduate Research Scholars seminar and lab project (this also double dipped with the biology 152 lab research project).

I mostly worked on my own to learn the material, and then reviewed before exams with others. I often get distracted around others, and end up not really learning anything. If any parts were confusing or if I had conflicting notes, I wrote down specific questions as I came up with them, so that I wouldn't forget them. Often times, the next day or lecture I would be able to answer them myself, but for the ones I did not, I would ask a friend or go to office hours. Note on office hours: go in with specific questions, because the sessions are often crowded and they will be more useful and efficient to you if you have direct

questions that are easily answerable. If the session is really crowded, don't be afraid to ask other people who are waiting to ask their questions, they may have the answer or maybe the same question. If they ask you a question, it's an opportunity to test your knowledge and teach it (this is also great in review study groups) or if you can't answer it, it may be a question worth thinking about too.

Textbooks: READ. They are practically another version of the lectures, but in a different enough way that it offers different ways of looking at the material. Also, lectures go so fast sometimes that the entire lecture seems like a blur of information and notes are confusing, so reading is key. After reading a chapter, I went back and did the problems in the text to test the material again (**********testing yourself over and over again at every stage of learning and seeing what's wrong/right and UNDERSTANDING WHY it's wrong/right, is pretty much the most important thing to take from my long explanations**********). From the problems at the end of the chapter, I did the synthesis ones and the ones that are similar to exam/problem sets, but doing them ALL is ridiculous and often confused me more. For the time I spent on them, I didn't get much from them, so I stopped doing most of them the second half of the semester when my grade in the class went from a little over average to a lot higher.

Problem Sets: GOLD FOR REVIEWING FOR EXAMS!!! So much material and examples are covered in the problem sets that are not mentioned during lectures and are very likely to appear either identically or almost identically on the exams. For the final, I actually printed out the ones from earlier in the semester and did them again. I also like using them as practice exams, since my semester didn't have any. Do them to the best of ability while circling ones unsure about, return to the circled ones with hints to remind you, then grade yourself on the whole problem set to see how you did and list questions/inconsistancies for office hours or study groups. This is a good way to see where you're not quite understanding something.

What I found probably the most helpful, that I started last minute before the second exam, but wish I had began when the course began or in 343, was to make a Book of Organic Chemistry. This includes EVERY SINGLE REACTION GIVEN IN LECTURE AND DISCUSSION!! Each sheet of paper = 1 reaction + the mechanism + any miscellaneous notes regarding the reaction, it's conditions, products, etc. It sounds time consuming, but it's not because instead of practicing a million reactions on scratch paper and then throwing them away after the exam, make at least one nice copy, be sure that everything on there is accurate (I suggest writing in pencil), and save it (it's really cool to see how thick the book gets during the semester, plus it's a little more engaging than reading notes or doing the problem sets again). **They are amazing for the final!!! By the end, I had a 121 page reference book of all of the reactions, mechanisms, and important notes, and I even consolidated a few similar reactions that did not have mechanisms on one page. The overall reaction and reaction name goes across the top, and then the mechanism below that, and a box for notes wherever it fits on the page. With this layout, you can cover the bottom and left to make flashcards for products, or just cover the bottom to test knowledge of the mechanism. Also, don't forget a table of contents, makes looking up reactions go a lot faster.

Good advice that I was given: **Think like a professor.**

**Student 18 (Fall 2013):**

I haven’t spent a whole lot of time in studying organic chemistry. I think on average it was around 10 hours/week(could be inaccurate cuz I never measured it) outside of the class (of course, it went up during exam/quiz weeks) I attended all the lectures (except review sessions. I only went to two I think.), took notes and all that. I didn’t even touch the textbook after I checked it once to look an example problem my

friend asked me about. I went to office hours before quizzes and exams, and for studying, I mostly relied on problem sets and practice exams/quizzes.

Here are tips I suggest to people.

1. **Don't study by yourself. During the semester, I have never studied by myself except the time when we had an exam after Thanksgiving break. I always worked with one or more friends who would drag my lazy self around to study with. This helps even when you know more than your friends. In my opinion, teaching others is one of the best ways to learn. Every time my friends asked me a question while studying with me or just over text (or when one of my friends even facetimed me over thanksgiving break for chem), I had to be sure because I didn't want to give them wrong information.**

2. Do NOT try to memorize stuff. If you're one of those people that are bad at memorizing, congratulations, you have a bit of an advantage over those who are good at memorizing because you will be forced to actually think. Because there are so many exceptions and pretty much no certain rules to follow except the basic principles of chemistry, trying to memorize reactions will screw you over. Instead of memorizing, what you should do is to think through why things happen whenever you learn a new reaction or a concept. **Trust me - professors don't want you to memorize materials, and if you do, they WILL get you.** Of course, There are some things that have to be memorized, but try to minimize them. In addition, question every single thing that professor/TA do. Try to find every tiny potential error or questionable aspects. I think one time I asked questions that could be answered after chapter 26 or something. Believe it or not, I think this way of thinking helped me a lot on exams when we got something that looks completely alien.

3. Do the problem sets. This is probably the most important thing to succeed in this class. I mentioned the abundance of exceptions in tip#2, and the only way to get used to those exceptions is to simply jump into the pool of examples. Because this isn't a class where you can memorize formulas and apply them to everywhere, problem solving will be very difficult without practice.

4. Utilize professor and TAs. Despite the common beliefs, they do not bite. They will not scold you for asking questions that you think are stupid. Lot of times, answer keys and lecture notes aren't enough explanations. I highly recommend you to read lecture notes, do problem sets and save your questions for office hours, or you could simply email them (although they seem to forget a few to reply to).

5. Don't skip lectures. If you think you can just catch up with lecture notes that professor puts up online, you're mistaken. Chances are, none of them will make sense without the professor's explanations. Also, attending lectures help you to know what your professor focuses more about (which is very likely to be on the exam). Also, don't procrastinate. Thankfully I had this one friend who just won't let me sit around and do nothing from the beginning of the semester, but I don't know what would've happened if she didn't force me to study. The work load gets bigger and bigger as the semester goes on, and because everything is cumulative, you will have harder and harder time to catch up.

6. Go through quizzes/exams, find out what you did wrong. I totally understand that this is painful, but hey, at least that pain will make you know what happens next time. If you did horribly on an exam or quiz early in the semester, don't give up. I think the professor mentioned that someone went from around 16% to mid-80 percent, and one of my friends went from around 60% to above 90%. So don't give up early - one exam won't ruin your life.

7. Think like the professor. Every exam, I did this thing where I tried to come up with potential problems that the professor will make to screw crammers or people who try to memorize everything. I think they were quite helpful in terms of preparation, although the professor managed to put something unexpected every time. Of course, this was possible because I did everything from 1-6.