

# CHEM 345: Intermediate Organic Chemistry

## Contact Information

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**3 credits: Lecture 75 min four times per week**

**Discussion 75 min twice per week**

## Lecture 1:

MTWR 11:45-1:00 PM

Room: Chemistry 1361

## Office Hours

Chem 1371 Monday 9:15-11:15, 2:00-4:00

Chem 1371 Tuesday 9:15-11:15

Chem 1371 Thursday 2:00-4:00

(or by appointment)

## Teaching Assistants

Michelle Fleetwood

mfleetwood@chem.wisc.edu

Andrew Maza

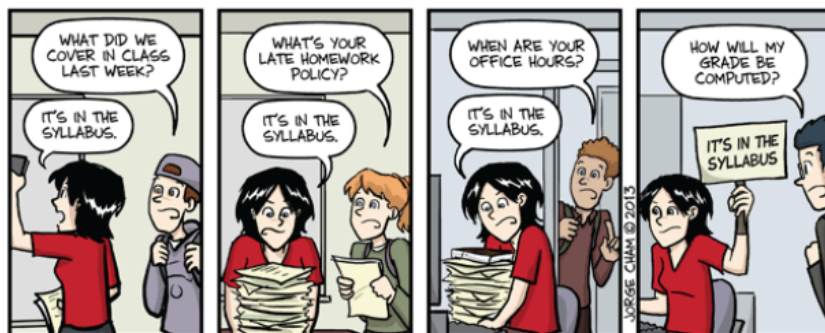
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**Piled Higher and Deeper by Jorge Cham**

[www.phdcomics.com](http://www.phdcomics.com)



# IT'S IN THE SYLLABUS

This message brought to you by every instructor that ever lived.

[WWW.PHDCOMICS.COM](http://WWW.PHDCOMICS.COM)

title: "It's in the syllabus" - originally published 5/10/2013

## Lectures

There are 24 usable days during a summer semester (compared to about 40 in a typical semester). To compensate, lectures are 75 minutes long. Saturation will unfortunately happen. I will try to break up the long lectures as much as possible. Moreover, they are on consecutive days. It does not allow much time for material to sink in, but plenty of time to burn out (me, especially). To be frank, the forty days in a typical semester are not enough to thoroughly cover what needs to be covered. My goal is to get you to the point where you can look at a reaction (rather it be in biochemistry or advanced synthetic chemistry or polymer science or 11<sup>th</sup> century Nordic studies) and be able to work it out. I will not cover every single reaction in organic chemistry because there are just too many of them. The TAs and I have met to find the most important ones (and those deemed by others as traditional organic reactions) and have done our best to organize them in a somewhat coherent manner. We have done that pretty well in weeks 1-6. Weeks seven and eight are a hodgepodge set of reactions that are important (some downright cool like spiropyrans and Bullvalene) but are different enough from the other reactions discussed that an adequate segue is not possible.

Due to the large amount of material to cover, I will be going quite quickly. Some of the details will be left for the TAs to go over in discussion. Please feel free to ask questions. Some answers might be better left after class or in office hours, but still ask them. Interrupt me if necessary.

Textbook: *Organic Chemistry*, 5<sup>th</sup> Ed., Marc Loudon

Quite a few of my course evaluations in the past stated that they never read or opened the book. I do not recommend this course of action, but I do understand it. I follow a different order than the textbook, but a majority of the material from Chapters 12-13,16-27, and some reactions and concepts outside the book will be covered. The course schedule has page numbers containing relevant information from the text along with key words that you can use in an index of any organic textbook for other explanations. Copies of the textbook are on reserve in the chemistry library for you to read. Instructors of Chem 344 may expect you to have this textbook for that lab course as well. Exams and quizzes are based on the material from lectures, power point tutorials, video lectures, discussion sections, and problem sets. The book is there to provide alternative explanations/approaches to help you understand the material covered.

### Video lectures

Learn@UW will host a variety of video lectures. These are typically 5-10 minutes long. They are there to highlight important concepts or clarify points in organic chemistry. I am told that the VLC media player works quite well with these videos if they are downloaded first. June 25, July 9, and July 23 are the days before exams. The topics chosen are related to but are slightly different. Video lectures will be available. Please watch these videos the day before and email me questions. I will go over these in lecture.

### Problem sets

There will be a problem set for each lecture day except for the day of an exam or the day preceding an exam. These problem sets will not be graded and are there to help you out. Keys will be available by the next lecture day on Learn@UW.

### Practice exams

I will make at least three practice exams available for each exam. The exams will be very similar to the practice exams in terms of directions. Answer keys for these exams will also be available. **DO NOT SIMPLY LOOK AT THE KEY. ATTEMPT THE PRACTICE EXAM FIRST. HAVE ANOTHER STUDENT IN THE CLASS GRADE IT AS YOU GRADE THEIRS. DISCUSS DISCREPANCIES AND ONLY THEN LOOK AT THE KEY.**



**Exams:**

There are three regular exams plus the final exam. Each regular exam will be worth 100 points. The regular exams will be held during class time. The dates are June 29, July 13, and July 27. The final exam will be worth 200 points and be held on August 6. The final exam will be a two hour exam, so you will need to set aside an additional 45 minutes either before or after lecture to accommodate the extra time.

**You may not drop any exam.**

Exams will be graded and returned at the next lecture. **PLEASE, PLEASE, PLEASE PICK THEM UP. LOOK AT THEM. MAKE SURE THE SCORES WERE ENTERED CORRECTLY AND THAT YOU UNDERSTAND WHAT YOU MISSED.**

*Exam regrade policy:* Mistakes in exam grading will occasionally be made. You will have one week after exams are returned to submit the entire exam for regrading. Keep in mind, since mistakes may or may not be in your favor, the exam grade can actually be lowered. All decisions on the regrades are final. **DO NOT UNDER ANY CIRCUMSTANCES CHANGE AN ANSWER AND SUBMIT IT FOR A REGRADE. THIS IS ACADEMIC MISCONDUCT AND WILL BE DEALT WITH HARSHLY.**

*Regrade submittal procedure:* Email Matt Bowman that you are submitting an exam for a regrade. Write on the exam score sheet which problem needs to be regraded and why. **DO NOT CHANGE ANYTHING ELSE.** Place the exam in Matt Bowman's mailbox in Chemistry 1146.

**Any student that falls just below a cutoff will have their final exam automatically regraded.**

### **Exam Penalties:**

Though technically, the regular exams are worth 100 points apiece and the final exam is worth 200 points, it is possible to score a negative value on the exam. There are four exam penalties that you should be aware of and **AVOID** at all costs. **CONSIDER YOURSELF WARNED.**

**Texas Carbon Penalty (TCP):** If one of your answers has a carbon drawn that has five bonds to it, that is an affront to organic chemistry. Such a blasphemous creation will result in a five point penalty in addition to missing any points on that question.

**Acid-Base Arrow Question (ABAQ):** To describe what is happening in a reaction, chemists used the curved arrow notation. This shows the movement of electrons. The most important example of this is in acid-base reactions. I will show you the answer to this question along with examples of wrong answers. **THIS IS THE ONE OF THE MOST FUNDAMENTAL CONCEPTS IN ORGANIC CHEMISTRY.** It is used in 343, 345, 344, biochemistry, etc... If you cannot answer this question, then -5 points.

**Name Penalty:** The most important question on any exam is the one that has you fill in the following blank:

Name: \_\_\_\_\_

Yet, the number of people that do not do this are staggering. (5% of the exams last semester left this blank or missed it).

**FIVE PERCENT!!!!!!!!!!** There is no excuse for this.

- 1.) You will need to write your name (First and Last) on the name line appearing on the scoresheet and the page with problem one.
- 2.) You will need to circle your TA's name on the scoresheet.
- 3.) You will need to write the first two letters of your last name (legibly) in a box. (**NOT INITIALS**)

**You must do all three of these to avoid the Name penalty.** The name penalty is a two point penalty that cannot be appealed.

**Time Penalty:** Writing on the exam before the TA's say start or after time is called can be a five point penalty.

After that whole exam penalty rant, here is a photo of a cat.



**In Discussion Quizzes:**

There will be four quizzes throughout the semester. The dates are not listed and they will not be listed. They will be held during discussion. Each will be worth 10 points. You may drop one quiz. Since you are allowed to drop one quiz, there will not be makeup quizzes.



*Electronic Homework:* If you are a fan of electronic homework, then this option will be available to you, but it is not required. There will be a series of problems each week. It costs \$38, but I want to stress that it is not required.

Signup instructions:

1. Go to <http://saplinglearning.com> and click on your country ("US Higher Ed" or "Canada") at the top right.
- 2a. If you already have a Sapling Learning account, log in and skip to step 3.
- 2b. If you have a Facebook account, you can use it to quickly create a Sapling Learning account. Click "Create an Account", then "Create my account through Facebook". You will be prompted to log into Facebook if you aren't already. Choose a username and password, then click "Link Account". You can then skip to step 3.
- 2c. Otherwise, click "create account". Supply the requested information and click "Create my new account". Check your email (and spam filter) for a message from Sapling Learning and click on the link provided in that email.
3. Find your course in the list (you may need to expand the subject and term categories) and click the link.
4. Select a payment option and follow the remaining instructions.
5. Work on the Sapling Learning training materials. The activities, videos, and information pages will familiarize you with the Sapling Learning user environment and serve as tutorials for efficiently drawing molecules, stereochemistry, etc. within the Sapling Learning answer modules. These training materials are already accessible in your Sapling Learning course.

Once you have registered and enrolled, you can log in at any time to complete or review your homework assignments. During sign up – and throughout the term – if you have any technical problems or grading issues, send an email to [support@saplinglearning.com](mailto:support@saplinglearning.com) explaining the issue. The Sapling support team is almost always more able (and faster) to resolve issues than your instructor.

To optimize your Sapling Learning experience, please keep your internet browser and Flash player up to date and minimize the use of RAM-intensive programs/websites while using Sapling Learning.



## Academic Misconduct

You are all adults. There is no reason to cheat, but plenty of reasons not to. An **F** in the course is one of many reasons. Cheat sheets, notes, textbooks, someone else's paper, iPods, cell phones, a crystal ball bearing the disembodied spirit of the Great Organic Chemist R. B. Woodward, etc... are prohibited from the exam. Use of these prohibited materials during an exam will result in a zero for the exam score or reduction of the final letter grade. You will only be allowed pencils/pens and model kits for the exams.

A percentage of the exams will be photocopied. Should an answer be changed and submitted for a regrading, academic misconduct has occurred and the perpetrator will receive an F in the course and be reported to the Dean's office.

Since it is possible that not all students will take the exam at the same time, it is theoretically possible for some students to receive advance knowledge of a quiz/exam. Students leaking test/quiz questions to other students that have not taken the exam is also regarded as academic misconduct and shall be dealt with accordingly.

I have been advised by the staff (some of them legal staff) that I cannot use pepper spray in dealing with wandering eyes. I will try to remember to remind the TAs proctoring the exams of that advice. If the TAs suspect anyone of this condition, they will announce for everyone to keep their eyes on their paper. If the problem persists, the TAs have the discretionary power to move any student suspected during an exam. **You must be above reproach.** Exams of adjacent students will be examined, and should there be ample evidence, lower exam scores including zeroes will be given to the perpetrator. Please fight against wandering eyes. Please shield your paper the best you can to remove any temptation from others.

**DO NOT TRY TO CHEAT. I have failed students in the past and I will not hesitate to do so this semester. I have no patience or respect for those that cheat.**

## Study tips

Between 1-4 hours after each lecture, start the problem set. ***Do not wait for the answer key to be posted to start the problem set.***

Between 4-8 hours after each lecture, recopy your notes for that lecture. Look for the patterns.

Organic chemistry is very cumulative. Once you start, you cannot stop. (Oh and you need to start right away). Material on exam I will be tested again on exams II, III, IV, and the Final. Likewise, with subsequent topics. The problem sets will not only cover current material but past material as well.

In the course schedule, the relevant page numbers from the text are listed. The exams are going to be based on the material from the lectures, lecture notes, problem sets, and discussions. The text is there to help you understand the material. I strongly suggest that you read the relevant pages either before or after lecture.

Make flash cards. Carry these with you wherever you go. Flip through them throughout each day.

A very good way to study is to study in groups. Multiple problem sets will be available to work on along with several practice exams. I suggest you form groups to study in. You can go about this by talking to classmates in discussion, etc... The sooner you set up these groups the better off you will be. If you wish a classroom to meet in, I can see about reserving one for you.

The best way to understand organic chemistry is constant practice. The TA's and I will do our best to provide quite a bit of practice in the form of problem sets and practice exams. Should you desire more practice, there are the problems at the end of each chapter in the book as well as multiple websites. Should you find a discrepancy in what the TA's, book, internet, or myself, please bring it to our attention immediately. It may be a case of a subtlety, an outright error, or an over generalization. Regardless, we'll try to explain the discrepancy.

## Discussion Sections

Due to the generous funding by the Madison Initiative for Undergraduates and the College of Letters and Science, we are able to offer discussion sections. There is a lot of material to cover, and little time to cover it. Sometimes, what I can briefly cover in the lecture will be better covered in your discussion section. The TAs in this course have experience in teaching organic chemistry, through labs, discussion sections, and tutoring. They may have a different way of looking at a topic. As a result, if you do not understand something from me, you may understand it from them. All discussion sections are held in the chemistry building.

Section 301	WR	8:55-10:10 AM	B355	Michelle Fleetwood
Section 302	WR	10:20-11:35 AM	B355	Michelle Fleetwood
Section 303	WR	10:20-11:35 AM	B357	Nick Walters
Section 304	TW	2:35-3:50 PM	B355	Nick Walters
Section 305	TW	1:10-2:25 PM	B357	Andrew Maza
Section 306	TW	2:35-3:50 PM	B357	Andrew Maza

### **Proper use of discussion sections:**

Make mistakes. People learn from mistakes. Be vocal. Go to the front of the board and write your answers. If they are correct, congratulations. If they are incorrect, *all the better* as it gives an opportunity to learn something and help out your fellow classmates. Remember, you are only really judged by your exams. Not your peers. Do not be afraid making mistakes. Better to make them in discussion than on an exam. There are many correct answers in organic chemistry (and many more incorrect ones). The TA's are there to give insight on the nuances of organic chemistry.

Get to know your fellow students. Set up study sessions with them. Try problems from problem sets independently and then consult on the answers before looking at the answer key. Try teaching each other.

### **Improper use of discussion sections:**

Just sitting there.

## **Additional Help**

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

The Organic TA Office is in room B317. There is a schedule posted outside the door of various TA's 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 343.

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](mailto:guts@rso.wisc.edu)  
<http://guts.studentorg.wisc.edu/>

There are also private tutors available. The General Chemistry Office (Room 1328) has a list of tutors and prices. If you do work with a tutor, please let them know that I post notes, problem sets, practice exams, and tutorials on Learn@UW. Anyone can access the Learn@UW Chem 343 site by using the visitor login. They should go to [learnuw.wisc.edu](http://learnuw.wisc.edu) and click on visitor login.  
USER NAME: **orgchem.pseudo**  
PASSWORD: **orgchem.pseudo**  
They will be able to access any handouts using that login.

# JUNE 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15 NMR Chemical Shift Integration pg 578-635	16 NMR Coupling/Splitting IR pg 540-558 pg 744-748	17 Grignards/Sodium borohydride pg 914-917	18 Hydrate, Hemiacetal, Acetal pg 1183- 1185, 910-912, 921-924	19	20	21
22 Imine Cyanohydrin pg 926-929 pg 907-909	23 Wittig Reaction Protecting Groups pg 933-936 pg 925-926	24 Beckmann* Baeyer-Villiger*	25 Suzuki, Heck, Grubbs pg 831-855	26	27	28
29 <b>Exam I</b> <b>11:45-1:00 PM</b>	30 Carboxylic acid Esters pg 948-970					
		NOTES:				

# JULY 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
		1 Esters/Amides pg 1004-1022	2 Acid chlorides LAH, Grignards, RLi pg 970-975 pg 1022-1032	3	4	5
6 Active Esters, Amide Coupling, DCC pg 1283-1292	7 EAS Deuteration Halogenation Friedel-Crafts pg 750-776	8 EAS Nitration Sandmeyer pg 1138-1142 pg 1146-1147	9 Clemmenson Wolff-Kishner NAS (S <sub>N</sub> Ar) pg 931- 932, 1234-1240	10	11	12
13 <b>Exam II</b> <b>11:45-1:00 pm</b>	14 Aldol Tautomerization Pg 1047-1072	15 Claisen beta-ketoacids pg 1072-1084 pg 976-978	16 Michael Robinson Annulation pg 1092-1099	17	18	19
20 Knovenagel* Mannich*	21 Umpolung* Dithiane* Benzoin Condensation*	22 Carbohydrate Game* Enamines pg 1186-1187	23 Cuprates Enolate alkylation pg 1084-1091 pg 1100-1105	24	25	26
27 <b>Exam III</b> <b>11:45-1:00 pm</b>	28 Curtius Hoffmann Wolff* pg 1150-1155	29 Pericyclic Reactions Cycloadditions Diels-Alder pg 1333-1365, 690-700	30 Pericyclic Reactions Electrocyclic Ring Opening/Closing pg 1333-1365	31		
		<b>NOTES:</b>				

# AUGUST 2015

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
					1	2
3 Pericyclic Reactions Sigmatropic Shifts pg 1333-1365	4 Miscellaneous	5 Review	6 <b>Final Exam</b> <b>11:00-1:00 pm or</b> <b>11:45-1:45 pm</b>	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31		NOTES:				



Add these numbers together:

946251.074373

9475780.400

**Chem 345: Survey**

Please answer the following questions so I can adapt Chem 345 to better suit your needs. Please turn this page in to Matt Bowman's mailbox in Chemistry 1146 by June 22.

What is your year? (Freshman, Grad Student, Returning Adult, etc...)

What is your major?

What do you hope to get out of this class? (Besides a good grade)

When is the ideal time for office hours (day and time)?

Do you learn a lot from textbooks?

Who was your 343 instructor?

What other classes are you currently enrolled in?

Have you found electronic homework to be helpful in your other classes?