

# CHEM 345: Intermediate Organic Chemistry

## Contact Information

Matt (Doc) Bowman

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Chemistry 5232

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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

Mondays 2:00-4:00 PM Chem 1371

Tuesdays 9-11:00 AM Chem 1371

(or by appointment)

## Teaching Assistants

Michelle Fleetwood

fleetwood@wisc.edu

Minxue Huang

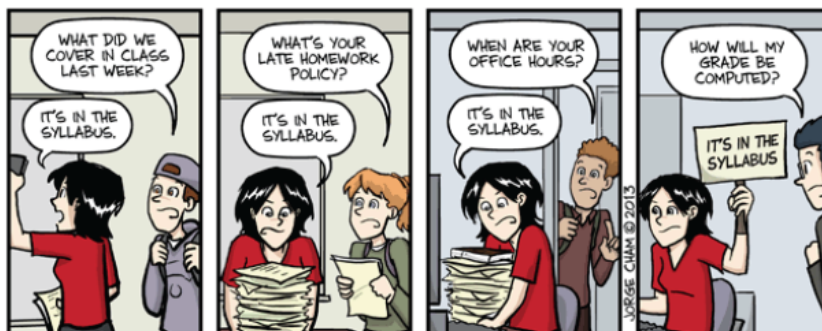
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**Piled Higher and Deeper by Jorge Cham**

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# 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. I have selected the most important ones (and those deemed by others as traditional organic reactions) and have done my 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*, 6<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.

#### 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.**

## 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. 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. **Forgetting that you changed an answer and submitting it for a regrade is still academic misconduct.**

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.

Since 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.

**THERE ARE NO ACCEPTABLE EXCUSES FOR ACADEMIC MISCONDUCT. I HAVE CAUGHT SEVERAL STUDENTS AND THEY NOW HAVE A DARK MARK ON THEIR PERMANENT RECORD. I HAVE NO SYMPATHY FOR THOSE THAT CHOOSE TO CHEAT.**



**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 on the following days: June 27, July 11, and July 25.

**You may not drop any exam.**

The final exam is worth 200 points and cannot be dropped. It will take place on Thursday, August 4. You will have two hours to take this exam, so that means there will be two timeslots: 11:00 am to 1:00 pm or 11:45 am to 1:45 pm. If neither of these times will work for you, please contact Matt immediately.

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.** Oh, out of principle, I refuse any exam regrade requests that use the word "deserve."

*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. (8% of the exams last spring left this blank or missed it).

**EIGHT PERCENT!!!!!!!** There is no excuse for this. **THIS IS YOUR WARNING!**

- 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. This penalty will be two points.

**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 bunny.



Drawing carbons with 5 bonds are trademark acts of monsters and bunny-haters.



### **Take Home Quizzes:**

There will be four take-home quizzes worth 10 points each. They will be handed out on June 16, June 30, July 14, and July 28. You can drop one quiz. They will be due the following Tuesday in Matt Bowman's mailbox in Chemistry 1146. The take home quiz is open book, open note, open classmate, but is not open TA/tutor/me. By open classmate I mean it is okay to converse with one another, but it is absolutely ***NOT*** okay to dissect each other or figure out answers by the use of haruspicy. In any event, I suggest you try the quiz on your own first.

### **Letter of Recommendation Policee:**

I try to teach about ~ 802.5 undergraduates each year. Unfortunately I won't be able to get to know all of you. That makes writing detailed rec letters nearly impossible. Rec letters from me will include grade and class rank and my impression of you. I can write them but I highly suggest that you get a rec from a prof in a small, higher level course or better yet a prof that you work for in a research group. They are more likely to give a better and more full depiction of you and will likely use spell check.

## 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	B355	Michelle Fleetwood
Section 302	WR	10:20-11:35	B355	Michelle Fleetwood
Section 303	WR	10:20-11:35	B357	Minsoo Ju
Section 304	TW	2:35-3:50	B355	Minxue Huang
Section 305	TW	1:10-2:25	2377	Minxue Huang
Section 306	TW	2:35-3:50	B357	Minsoo Ju

### **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 of 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 345.

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/>

The College of Engineering Undergraduate Learning Center is offering drop in tutoring this summer Monday through Thursday from 3:30-6 pm in Room 405 Wendt Commons. Hours are available on their Website <http://ulc.engr.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 345 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 2016

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
13C NMR and IR pg 569-590 NMR Chemical Shift and Integration pg 611-626	NMR Chemical Shift and Integration and Splitting/Coupling pg 627-665	NMR Chemical Shift and Integration and Splitting/Coupling pg 627-665  Grignards and Sodium Borohydride pg 970-977	Cyanohydrin and Hydrate Formation Pg 963-969,  Acetal/Hemiacetal formation pg 978- 983			
20	21	22	23	24	25	26
Acetal/Hemiacetal formation pg 978- 983 Imines/Reductive Amination pg 984-986, 1199- 1201	Imines/Reductive Amination pg 984-986, 1199- 1201  Wittig Reaction pg. 990-994	Clemmensen Wolff-Kishner Reduction pg 988- 990	Rearrangements: Baeyer-Villiger Beckmann Not Covered in Lecture			
27	28	29	30			
<b>Exam One</b>	Irreversible Rxns: Carbanions and Hydrides pg 1079- 1083, 1086	Acyl transfer/ RCO <sub>2</sub> H derivatives pg 1004-1024, 1060-1064  Acid chlorides anhydrides pg 1024-1027, 1067-1075	Amides pg 1048- 1049,1053, 1064- 1065, 1378-1383, 1425-1426  Amide Coupling Peptide Synthesis pg. 1391-1399			
		<b>NOTES:</b>				

# JULY 2016

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
4 <b>No Class</b>	5 Nitrile Chemistry and Strecker Synthesis pg 1065-1067, 1388-1389 EAS: Halogenation and deuteration pg 799-803, 810-820	6 EAS: Friedel Crafts Vilsmeier-Haack pg 805-810 EAS: Sulfonation and Nitration pg 803-804, 822-825	7 Sandmeyer Reaction pg 1206-1209 Nucleophilic Aromatic Substitution pg 885-887, 1342-1345	8	9	10
11 <b>Exam Two</b>	12 Tautomerization and Aldol Reaction pg 1103-1113, 1119-1130, 1152-1153	13 Claisen Condensation Malonic Ester Synthesis Acetoester Synthesis pg 1133-1152, 1030-1032	14 Conjugate addition, Michael Rxn, Robinson pg 1156-1166 Mannich Reaction Not covered in Loudon	15	16	17
18 Umpolung Benzoin Condensation Dithiane Reactions (Not in book)	19 Enamine pg 986-987 Cuprates pg 1168-1171	20 Advanced Organometallics Suzuki, Heck Pg 891-906 Grubbs Pg 907-911	21 Curtius and Hoffmann Rearrangements	22	23	24
25 <b>Exam Three</b>	26 Specialized Bromination pg 841-845, 1113-1118	27 Nucleophilic Aromatic Substitution pg 885-887, 1342-1345	28 Pericyclic Reactions pg 1449-1458 Pericyclic Reactions Cycloadditions Diels Alder pg 1463-1467	29	30	31
		<b>NOTES:</b>				

# AUGUST 2016

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1 Pericyclic Reactions Electrocyclic Reactions pg 1458-1462	2 Pericyclic Reactions Sigmatropic Rearrangements pg 1467-1479	3 Review	4 <b>Final Exam</b> 11:00-1:00 pm or 11:45-1:45 pm	5	6	7

### **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 20.

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?

Did you have a subscription to TopHat?