

University of Wisconsin-Madison
CHEM 345: Intermediate Organic Chemistry

Contact Information

Matt (Doc) Bowman
262-2519
Chemistry 5232
bowman@chem.wisc.edu
3 credits-Traditional Carnegie Definition

How Credit Hours are Met: *This class is 3 credits. It meets for 1.25 hours of lecture four times per week and 1.25 hours of discussion twice per week over the 8-week summer term. Over the course of the term, students are expected to engage in at least 135 hours of learning activities, which includes class attendance, reading, studying, preparation, problem sets, and other activities.*

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.

Prerequisite: Grade of C or better in Chem 343

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

Instructional Mode: face-to-face

Lecture 1:

MTWR 11:45-1:00 PM
Room: Psychology 113

Office Hours

Mondays 2:00-4:00 PM Chemistry 1371
Tuesdays 9:00-11:00 AM Sterling 2425
(or by appointment)

Teaching Assistants

James Langford	jclangford@wisc.edu
Leah Nkulu	nkulu@wisc.edu
Samuel Wood	sawood5@wisc.edu

Canvas URL: <https://canvas.wisc.edu/courses/145443>

TA Office Hours

There are no TA office hours this summer. Be sure to attend discussion sections.

Learning Outcomes:

- a.) Interpret, visualize, and predict reactivity of molecules by their Lewis structures
- b.) Interpret NMR and IR Spectral information
- c.) Solve problems by using different approaches
- d.) Understanding of the main concepts in *Organic Chemistry*, 6th Ed., Marc Loudon and Jim Parisi in Chapters 12-13, 16-27.
- e.) Students will learn how to master an intellectual discipline that requires both understanding of a complex conceptual framework and memorization of specific facts. This general goal will be pursued in the specific context provided by introductory organic chemistry. There are different paths to achieving this learning outcome, because different people learn in distinct ways. Students will be challenged to determine the learning strategies and styles that are most effective for them. Achieving this learning outcome will empower students to master other disciplines they encounter subsequently as they pursue diverse careers. These later challenges will arise without the framework provided by a syllabus, a textbook, lectures, discussion sections and frequent assessments (exams). Therefore, Chemistry 343 and 345 are taught in a manner that encourages students to take responsibility for their own learning success.

Grading:

The grade will be based on:

Exams (3 x 100 points)

TopHat Points 20 points **The Join Code for Top Hat is 141573**

Quizzes (4 x 8 points) If there are more than four quizzes, the lowest quizzes will be dropped.

Final Exam (200 points)

The maximum number of points possible will be **552 points**.

ABCDF:

If you earn 90% of the total points, you will receive an A.

If you earn 77% of the total points, you will receive *at least* a B.

If you earn 57% of the total points, you will receive *at least* a C.

If you earn 40% of the total points, you will receive *at least* a D.

There is more information further on in the syllabus.

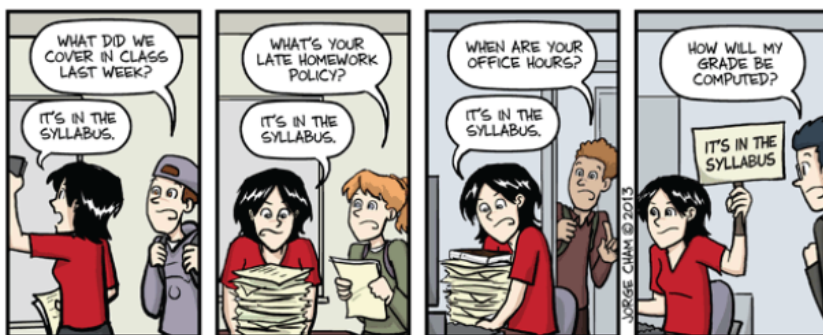
ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

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 Matt 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. Matt, will work either directly with 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>

DIVERSITY & INCLUSION

Institutional statement on diversity: "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.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." <https://diversity.wisc.edu/>



IT'S IN THE SYLLABUS

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

WWW.PHDCOMICS.COM

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

Chem 345 is different from Chem 343.

If chem 343 is



Then chem 345 is



Textbook: *Organic Chemistry*, 6th 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. 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

Canvas 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.

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 Canvas.

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.**

Lecture Capture

I will do my best to record all of the lectures on video and post them on canvas. However, please still come to lecture. Sometimes technical difficulties occur and a lecture is not available.

Mental Health Resources:

Now is as good as time as any to talk about mental health. I realize you are under a lot of pressure. Some of that pressure is internal and some of that is external. Regardless of the source of the pressure, the pressure is very real. Students have a tendency to equate grades with future happiness. It is an understandable connection, but not really a true one. I have quite a few C's on my undergraduate transcript (a few in chemistry) and I still ended up with my dream job. I have had a student that received an F in organic chemistry and had to retake the class. She went on to medical school. So, a low grade is not the end of the world.

If disaster happens or at anytime you feel that you cannot cope with something, or just need to vent, there are resources available on campus for you. Take advantage of them.

University Health Services (UHS):

Offers group, individual, couple/partner therapy stress management, and disordered eating assessments and treatment at no cost. It also provides massage therapy, yoga, and other wellness services.

Student Activity Center 7th floor 608-265-5600

www.uhs.wisc.edu/mentalhealth/getting-started

Ask.Listen.Save:

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

Student Activity Center Suite 3196 www.Asklistensave.org

Badgerspill:

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

www.badgerspill.com

Please look on the canvas page for the mental health resource sheet for more resources.

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.

Leaving the examination room with your exam is also academic misconduct. Such exams will be treated as zeroes.

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 time. Please check your schedules for potential conflicts. The dates are July 1, July 15, and July 29. Please notify me **ASAP by email** of any conflicts so alternative arrangements can be made. **Notifying me the week of an exam is NOT ADVISABLE as I will be cranky.**

You may not drop any exam.

The final exam is worth 200 points and cannot be dropped.

It will be held on August 8

There are two times to take the exam:

11:00 am to 1:00 pm or 11:45 am to 1:45 pm

Exams will be graded and scanned. Electronic copies of the exams will be posted to canvas. Hard copies will **NOT** be returned because of logistics. PLEASE, PLEASE, PLEASE LOOK AT THEM. UNDERSTAND WHAT YOU HAVE MISSED. MAKE SURE THE SCORES WERE ENTERED CORRECTLY. **YOU WILL HAVE ONLY ONE WEEK TO REPORT DISCREPANCIES.**

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.

The final exam will be graded on August 8, scanned, and posted on canvas on August 9. You will have 24 hours to proofread the grading and email Matt with any grading concerns. The final cutoffs will be determined AFTER the 24 hour review period. The final cutoffs will not be released.

Top hat:

There will be 20 points available for top hat lecture questions. There will be lots more top hat questions during lecture.

% Questions Answered Correctly	Top Hat Points at END
59.6-100	20
49.6-59.5	16
39.6-49.5	12
29.6-39.5	8
14.6-29.5	4
0-14.5	0

Last semester, 70% of students answered at least 60% of the questions correctly. 80% of the students answered at least 50% of the questions correctly.

The bar for full credit is set at 60%. This is to take into account everything from illness, missing class, family emergencies, technology issues to rabid wombat attacks.

The Join Code for Top Hat is 141573

Quizzes:

There will be 4 quizzes worth 8 points each. If there are more than 4, then the lowest scores will be dropped. The quizzes are 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. Also, do not post answers on piazza or chegg or similar websites. The format of the quizzes will vary. Some will be tophat, some will be with the problem sets, and some will be on canvas.

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 three 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 (AB AQ): 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.

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

Exams: It is your responsibility to turn your exam into the box at the front of the class. Any exam that is not turned into the box at the front of the class will **not** be counted. In the past, we have had students take the exam from the examination room and then have it mysteriously reappear in the examination room the next morning. This is academic misconduct.

Any repeat violators of Texas Carbon Penalty will be fed to carnivorous Jasperian Mountain goats. The chemistry department has imported two (Dagon the Devourer and Edna) for this purpose.



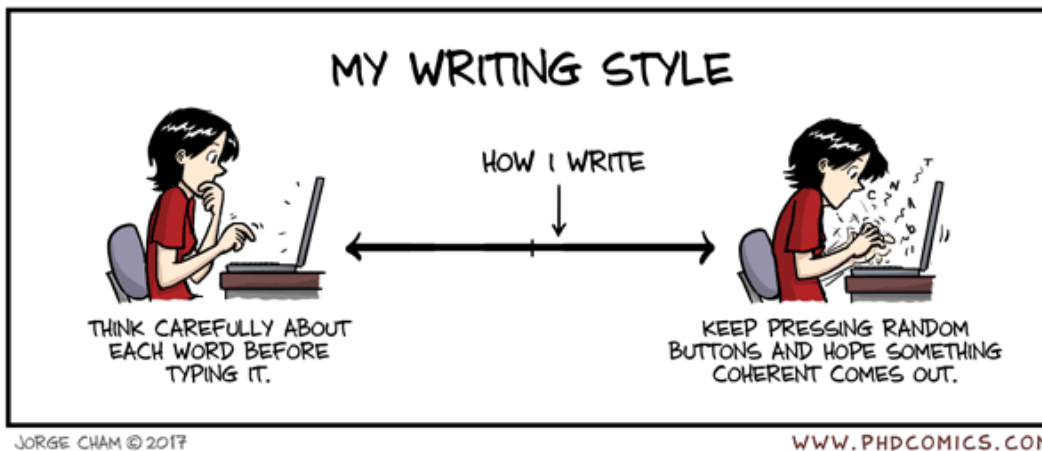
Editor's Note:
(The image is altered as a tree was photoshopped into the picture for aesthetics).

Letter of Recommendation Police:

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.

Piled Higher and Deeper by *Jorge Cham*

www.phdcomics.com



title: "How I Write" - originally published 1/27/2017

Yup. That pretty much sums me up (only more to the right on that particular writing spectrum).

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.

Sec 301 W/R	8:55-10:10	Chem 2311	Leah Nkulu
Sec 302 W/R	10:20-11:35	Chem 2311	Leah Nkulu
Sec 303 W/R	8:55-10:10	Chem B379	Sam Wood
Sec 304 T/W	2:35-3:50	Chem 2311	Sam Wood
Sec 305 T/W	1:10-2:25	Chem 2373	James Langford
Sec 303 T/W	2:35-3:50	Chem 2373	James Langford

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 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
<http://guts.studentorg.wisc.edu/>

Drop-in tutoring through the College of Engineering's Undergraduate Learning Center is free and open to any student enrolled in a course covered by our program. Drop-in tutoring will be available Monday-Thursday, 3:00-5:30PM, on the 3rd floor of Wendt Commons from June 18 – August 9.

<http://ulc.engr.wisc.edu>

There are also private tutors available. The Undergraduate 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 canvas. Anyone can access the canvas by going to:

<https://canvas.wisc.edu/courses/145443>

JUNE 2019

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
2						1	2
9	3	4	5	6	7	8	9
16	10	11	12	13	14	15	16
23	17 13C NMR and IR pg 569-590 NMR Chemical Shift and Integration pg 611-626	18 NMR Chemical Shift and Integration and Splitting/Coupling pg 627-665	19 NMR Chemical Shift and Integration and Splitting/Coupling pg 627-665 Grignards and Sodium Borohydride pg 970-977	20 Cyanohydrin and Hydrate Formation Pg 963-969, Acetal/Hemiacetal formation pg 978- 983	21	22	23
30	24 Acetal/Hemiacetal formation pg 978- 983 Imines/Reductive Amination pg 984-986, 1199- 1201	25 Imines/Reductive Amination pg 984-986, 1199- 1201 Wittig Reaction pg. 990-994	26 Clemmensen Wolff-Kishner Reduction pg 988- 990	27 Rearrangements: Baeyer-Villiger Beckmann Not Covered in Loudon	28	29	30
			NOTES:				

JULY 2019

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1 Exam One	2 Irreversible Rxns: Carbanions and Hydrides pg 1079- 1083, 1086	3 Acyl transfer/ RCO ₂ H derivatives pg 1004-1027, 1060-1064, 1067-1075	4 No Classes	5	6	7
8 Amides pg 1048- 1049,1053, 1064- 1065, 1378-1383, 1391-1399, 1425- 1426	9 Nitrile Chemistry and Strecker Synthesis pg 1065- 1067, 1388-1389 EAS: Halogenation pg 799-803, 810-820	10 EAS: Friedel Crafts Vilsmeier-Haack pg 805-810 EAS: Sulfonation and Nitration pg 803- 804, 822-825	11 Sandmeyer Reaction pg 1206-1209 Nucleophilic Aromatic Substitution pg 885- 887, 1342-1345	12	13	14
15 Exam Two	16 Tautomerization and Aldol Reaction pg 1103-1113, 1119-1130, 1152-1153	17 Claisen Condensation Malonic Ester Synthesis Acetoester Synthesis pg 1133-1152, 1030-1032	18 Conjugate addition, Michael Rxn, Robinson pg 1156- 1166 Mannich Reaction Not covered in Loudon	19	20	21
22 Umpolung Benzoin Condensation Dithiane Reactions (Not in book)	23 Enamine pg 986-987 Cuprates pg 1168-1171	24 Advanced Organometallics Suzuki, Heck Pg 891-906 Grubbs Pg 907-911	25 Curtius and Hoffmann Rearrangements	26	27	28
29 Exam Three	30 Specialized Bromination pg 841-845, 1113- 1118	31 Nucleophilic Aromatic Substitution pg 885- 887, 1342-1345				

AUGUST 2019

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
			1 Pericyclic Reactions pg 1449-1458 Cycloadditions Diels Alder pg 1463-1467	2	3	4
5 Pericyclic Reactions Electrocyclic Reactions pg 1458-1462	6 Pericyclic Reactions Sigmatropic Rearrangements pg 1467-1479	7 Review	8 Final Exam 11 am to 1 pm or 11:45 am to 1:45	9	10	11
				16	17	18
				23	24	25
26	27	28	29	30	31	
		NOTES:				