Chemistry 2331, Honors Organic Chemistry I
Fall Semester 2012

Instructor: Professor William Tolman, Smith 139A, wtolman@umn.edu

Office Hours: TBA

Class Website: Moodle

Text: Janet Gorzynski Smith, **Organic Chemistry**, **Third Edition**, *McGraw-Hill Companies, Inc.* Study Guide to book and molecular model set suggested. Packaged with Connect Plus.

McGraw-Hill Connect Chemistry Text WebSite:
http://connect.mcgraw-hill.com/class/j_wissinger_spring_2013_mwf_9-10_am See instructions below.

Examinations: Four 50-minute midterm examinations along with a cumulative final examination will be given. The lowest score of the midterm examinations will be dropped.

Special Projects: Two group projects will be assigned and due week 4 and week 10.

Grading:		
Projects (2 x 25 pts)	50 pts	9.1 %
3 Best mid-semester exams (3 x 100 pts)	300 pts	54.5 %
Cumulative Final Exam (200 pts)	200 pts	36.4 %
	550 pts	

Welcome to Honors Organic Chemistry I. This course will begin by providing the fundamentals of organic structure, reactivity, stereochemistry, and mechanisms. These principles will then be used to explore select functional group syntheses and reactions along with spectroscopic analyses. Expectations are that students will learn basic concepts quickly from the textbook readings and condensed lecture presentations so that class time can be devoted to special topics and in-class group problem solving assignments. Students will have the opportunity to learn about advanced topics such as kinetic and thermodynamic mechanistic analyses, computational chemistry methods of conformational analyses, green chemistry and more. I hope you enjoy the challenge and diversity of the course.

Connect Chemistry: The Smith textbook's **Connect** website features many useful learning tools. For example, accessing this site gives you the entire textbook online (e-book) that can be viewed on a computer or other mobile device. There is also a LearnSmart Module that is great for reviewing chapters in a "gaming" manner that is fun and interactive. In order to have access to the assignments you will need to activate your McGraw-Hill Connect Account by registering using the link for our class below (or on the Moodle course website). The Connect platform uses a structure drawing tool called *ChemDraw* for the many mechanism and syntheses problems which requires download of a plug-in. To download this plug-in to your personal computer go to: http://www.mhhe.com/sem/chemdraw/. As a special note, the Walter Library computer lab, Room 103, already has the required ChemDraw plug-ins downloaded and ready to use on all of the PCs.

http://connect.mcgraw-hill.com/class/w_tolman_fall_2012_mwf_9-10_am

Policy on Missed Midterm Exams: A student can be excused from one midterm exam for a true emergency, serious illness, or University sponsored activity. The student should contact the instructor as soon as circumstances allow and appropriate documentation must be provided. If the circumstances are deemed as appropriate for missing the exam, the unweighted average score of all other midterm exams and of the final exam in the course will be used in place of the missed exam. If circumstances lead to a student missing more than one midterm exam, the student should immediately schedule a meeting with the instructor to discuss any available options. The combined score for the set of midterm exams is calculated as the average of the three highest midterm exam scores (which may include the replacement score for a midterm exam with excused absence).

Policy for "I" Grades: In accordance with department policy, an **Incomplete** grade will only be considered when the final exam cannot be taken and if work completed to that date (at least two midterms must have been taken and an approved reason for missing a third) is satisfactory (C- or better). The instructor and student will then sign a contract stating that the student will take a regularly scheduled 2302 final exam during the subsequent regular academic semester. If the student fails to take the scheduled final exam and the work in the course completed prior to that date does not satisfy the requirements of the course, an **F** or **N** grade will be assigned.

Exam Regrade Policy: Regrade requests will only be accepted for exams written in ink. If you have a complaint about the grading of your exam, complete a ***"Request for Regrade"*** form (available outside my office door or on our class WebVista site) and staple it to your exam. DO NOT WRITE ON YOUR EXAM. . Regrades are to be submitted by the end of the class period two weeks after the exam was returned. When an exam is submitted for regrade, the entire exam will be reviewed and the grade changed higher or lower, accordingly. Therefore, be sure to check all of your answers before submitting the exam for reevaluation. ***Note: Altering an exam and submitting it for regrade is an act of scholastic dishonesty and I will treat these situations seriously with a "0" recorded for the exam and documentation of the event submitted to the Office for Student Conduct and Academic Integrity.***

How To Do Well In This Class

1. **Come to class** and read the assigned sections that will be studied each day. Be prepared to ask questions you had from the reading and engage in class problem solving sessions.

2. **Do the problems assigned in the book**! The **only** way to learn organic chemistry is to write it on paper. Work the suggested chapter problems as you go through the text to reinforce ideas, and then use the end-of-chapter problems to test your comprehensive knowledge. Again, do not just do the problems in your head or read the Solutions Manual. You must be able to properly draw the structures of organic molecules. Exams are graded by what you can accurately put on paper, not what is in your head.

3. **Do not approach the course through memorization.** The beauty of organic chemistry is that the material from Chapter 1 all the way to Chapter 30 is intimately interconnected. Understanding the basic concepts such as molecular structure, movement of electrons, mechanisms, and bond stabilities allows one to predict and problem-solve with new reactions and molecules. Learning the synthesis of one functional group is learning the reaction of another. Work on the big picture, continually.

Tutor Hours: Organic tutor hours will be held in Smith 118/122 throughout the semester beginning January 24th according to the schedule posted on the door and my website. It is important to me that your time is well spent in this room. Please inform me or the Head Organic TA (Brian Woods, woods134@umn.edu) if tutors are not present at their scheduled time, helpful, or leave for extended periods of time. A reminder that the purpose of a tutor is to help you learn, not simply give you answers to questions or problems. The tutors are instructed, in fact, to ask YOU questions that will help you understand what concept you are missing that is preventing you from solving a particular problem. Self-discovery will enhance the depth and retention of your knowledge.

Scholastic Dishonesty: "Scholastic dishonesty is any act that violates the rights of another student with respect to academic work or that involves misrepresentation of a student's own work. Scholastic dishonesty includes (but is not limited to **cheating on** assignments or **examinations**; plagiarizing (misrepresenting as one's own work done by another); submitting the same or substantially similar papers for more than one course without consent of all instructors concerned; depriving another of necessary course materials; sabotaging another's work." – *Classroom Grading and Examination Procedures, College of Liberal Arts.* If a student is guilty of scholastic dishonesty, they will receive no credit, that is, a **"0",** for the work involved or an **"F"** for the course and the incident **will** be reported to the ***Office for Student Conduct and Academic Integrity.***

LECTURE SCHEDULE – Fall 2012

Below is a tentative schedule for the semester that I reserve the right to revise as we go along. However, the information below should help you in knowing what you should read/skim BEFORE class and which sections of each chapter I will be covering.

DATE	TOPIC	READING
Week 1	**Structure and Bonding - Review**	
	Lewis structures, molecular shape, hybridization	1.1-1.8
	Electronegativity and Bond Polarity	1.9-1.13
	Acids and Bases – Review	
	Definitions, factors affecting acidity and reactions	2.1-2.8
	Introduction to Organic Molecules and Function Groups	
	Identifying functional groups	3.1-3.3
	Relationship to physical properties and reactivities	3.4, 3.8
	Recognition in biomolecules and cell membrane	3.5-3.7, 3.9
	Special Topics – *In-class work with molecular models*	
Week 2	**Alkanes**	
	Nomenclature, physical properties	4.1-4.8
	Conformations acyclic and cyclic	4.9-4.13
	Combustion of alkanes	4.14
	Special Topic: *Use of computational programs for conformational analyses*	
	Submit Topic for Approval - Project I (Computational Analysis)	
Week 2/3	**Stereochemistry**	
	Definitions, enantiomers, diastereomers, R/S	5.1-5.10
	Physical property comparisions	5.11-5.13
	Special Topics – *Separation of Enantiomers and Biological Activity of Drugs and their Enantiomers*	
Week 4	**Exam I**	
	Understanding Organic Reactions	
	Kinds of reactions, bond dissociation energies	6.1-6.4
	Thermodynamics and equilibrium	6.5-6.6
	Reaction Energy Diagrams	6.8
	Kinetics and catalysts	6.9-6.10
Week 5	**Project I (Computational Analysis) Due**	
	Alkyl Halides and Nucleophilic Substitution	
	Alkyl halide – nomenclature, physical properties, in nature	7.1-7.5
	S_N2 Reaction characteristics	7.6-7.12
	S_N1 Reaction characteristics	7.13-7.14, 7.16
	Hammond Postulate and Synthetic applications	
	Special Topics – *How chemists study reaction mechanisms*	
Week 6	**Alkyl Halides and Elimination Reactions**	
	Characteristics of E2 and E1 reactions	8.1-8.9
	Stereochemistry of E2 reactions	8.8
	Identifying S_N1, S_N2, E2 and E1 reactions	8.11

Week 7	**Alcohols, Ethers, and Epoxides**	
	Structure, Nomenclature, and Properties	9.1-9.5
	Preparation of alcohols, ethers, &epoxides	9.6
	Dehydration reactions	9.8-9.11
	Conversion to Alkyl halides and tosylates	9.11-9.13
	Special reactivity of epoxides	9.15-9.17
	Special Topic – ***The role of epoxides in biological molecules- Brevetoxin B and more***	
Week 8	**Exam II**	
Week 8/9	**Alkenes**	
	Structure, Nomenclature, and Properties	10.1-10.5
	Addition to double bonds – Markovnikov, Anti-M	10.6-10.16
	Alkenes in organic syntheses	10/17
	Special Topic – ***Effect of unsaturation in Fatty Acids***	
Week 10	**Alkynes**	
	Structure, Nomenclature, and Properties	11.1-11.4
	Preparations	11.5
	Addition reactions	11.6-11.10
	Acetylide reactions	11.11
	Applications in syntheses	11.12
Week 11	**Exam III**	
	Oxidation and Reduction	
	Common reducing agents	12.1-12.2
	Reducing π bonds and polar C-X bonds	12.3-12.6
	Oxidizing agents	12.7
	Epoxidations, dihydroxylations, oxidative cleavage	12.8-12.11
	Alcohol Oxidations	12.12
	Special Topics – ***New Green Oxidation Reagents & Nature's Cyclooxygenase enzymes (COX) and New Non-steroidal Anti-Inflammatory Drugs (NSAIDS)***	
Week 12	**Mass Spectrometry and Infrared Spectroscopy**	
	Assignment of Project II (Integrated Spectral Problem)	
	MS Theory and molecular ion peaks	13.1-13.2
	Fragmentation Pattern and Structure Indentification	13.3-13.4
	IR Theory	13.5-13.7
	Use of IR for functional group identification	13.8
Week 13	**Nuclear Magnetic Resonance Spectroscopy**	
	Instrumentation and Theory	14.1-14.2
	^{1}H NMR Chemical shifts and integration	14.3-14.5
	Spin-spin splitting	14.6-14.9
	^{13}C NMR	14.11
	Special Topics – ***Solving Integrated Spectral Problems – Group Problems and Web Examples***	
Week 14	**Exam IV**	
	Project II Due – Solving An Integrated Spectral Problem	

Week 14/15	**Radical Reactions**	
	General Features of Radical reactions	15.1-15.2
	Free radical halogenations/mechanism	15.3-15.8, 15.10
	Radical Polymerizations/Synthesis of Polymers	15.14
	Special Topics: ***Antioxidants in nature and food preservatives.***	
Week 15	**Course Review**	