Chemistry 2332, Honors Organic Chemistry II
Spring Semester 2013

Instructor: Professor Jane E. Wissinger, Kolthoff 455, 612-625-9586, jwiss@umn.edu

Office Hours: Mon. 10:30-11:30 a.m. Wed. 3:30-4:30 p.m., Thurs., 1:30-2:30 and by appointment.

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: Three 60-minute midterm examinations along with a cumulative final examination will be given.

Special Projects: Two group projects will be assigned and due week 7 and week 14.

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

Welcome to the second semester of Honors Organic Chemistry. Through this course, we will continue to explore syntheses, reactions, mechanisms, and analyses of organic molecules as well as biomolecules and polymers. 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 emerging technologies in the fields of pharmaceutical chemistry, Green chemistry and renewable resource polymers as well as select topics in catalysis, spectroscopy, and bio-organic chemistry. 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.

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Policy on Missed Midterm Exams: All midterm examinations will count towards a student's final grade. That is, no midterm grade will be dropped. In general, no make-up exams will be given. A student can be excused from **one** midterm exam for a true emergency or serious illness, or University-related activity. In these circumstances contact me as soon as possible and supply documentation of the reason for missing the exam. If, and only if, the nature of the emergency is deemed an acceptable reason for missing the exam, the un-weighted average score of the other two midterm exams and the final examination 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 me to discuss if any options are available.

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 – Spring 2013

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	**Conjugation, Resonance, and Dienes**	
	Definitions, Characteristics, and Resonance	16.1-16.5
	Conjugated Dienes and Reactions	16.6- 16.11
	Diels-Alder Reaction and Synthesis of Steroids	16.12-16.14
	Special Topics: ***Molecular Orbital Description of Conjugated Systems &Facile synthesis of Industrial Insecticides through the Diels-Alder Reaction***	
Week 2	**Benzene and Aromatic Compounds**	
	Benzene structure, properties, and spectroscopy	17.1-17.5
	Aromatic, Nonaromatic, Anti-aromatic	17.6-17.8
	Molecular Orbitals and Polygon Rule	17.9-17.11
	Electrophilic Aromatic Substitution	
	Reaction overview and characteristics	18.1-18.2
	Mono-substitution of Benzene	18.3-18.4
	Friedel-Crafts Alkylation/Acylation,	18.5
	Special Topic: ***Nanotubes and Nanotechnology***	
Week 3	**EAS, contd**	
	Directing Affects towards poly-substitution	18.6-18.12
	Side-Chain Reactions	18.13-18.14
	Multi-Step Syntheses	18.15
	Carboxylic Acids and the Acidity of the O-H bond	
	Structure, Properties, and review syntheses	19.1-19.6
	Acidity of carboxylic acids and benzoic acids	19.7-19.12
	Sulfonic acids and amino acids	19.13-19.14
	Special Topic: ***Green Advances in the Industrial Synthesis of Ibuprofen***	
Week 4/5	**Exam I**	
	Introduction to Carbonyl Chemistry	
	Functional Group Overview and relative reactivities	20.1-20.3
	Reduction Reactions	20.4-20.7
	Oxidation of Aldehydes (Tollen's test)	20.8
	Organometallic Addition to Carbonyls& Epoxides	20.9-20.11, 20.13-20.14
	Protecting Groups and synthetic strategies	20.12
	Conjugate Additions	20.15
	Special Topic: ***Enantioselective Reductions Literature search***	
Week 5/6	**Aldehydes and Ketones – Nucleophilic Additions**	
	Structure, Properties, Spectroscopy, Synthesis review	21.1-21.6
	Reactions involving Nu addition to the carbonyl	21.7-21.9
	Wittig Reaction	21.10
	Imine, Enamine, and Hydrate Formation	21.11-21.13
	Acetal formation and use as protecting groups	21.14-21.17
	Proposed Project I Title Submitted/Approved	
	Example: Protecting Group Chemistry	

LECTURE SCHEDULE – Spring 2013, continued

DATE	TOPIC	READING
Week 7	**Project I Due**	
	Carboxylic Acids &Derivatives – Nucleophilic Acyl Substitution	
	Functional Groups, Properties, Spectroscopy, Examples	22.1-22.6
	Nucleophilic Acyl Subst. Mechanism/Reactivities	22.7
	Reactions of Acid Chlorides and Anhydrides	22.8-22.9
	Reactions of Carboxylic Acids and Ester	22.10-22.12
	Reactions of Amides and Nitriles	22.13, 22.18
	Examples in Nature and Polymers	22.14-22.17
	Special Topic: ***Relevant Enzyme Mechanisms***	
Week 8	**α-Substitution Reactions of Carbonyls**	
	Enols and Enolate Anions	23.1-23.5
	α-Halogenation and subsequent reactions	23.6-23.7
	α-Alkylation – direct	23.8
	Malonic Ester and Acetoacetic Ester Syntheses	23.9-23.10
	Carbonyl Condensation Reactions	
	Aldol Reaction	24.1-24.4
	Claisen Reactions	24.5-24.7
	Michael	24.8
	Robinson Annulation	24.9
	Special Topic: ***Silyl enol ether chemistry***	
Week 9	**Exam II**	
	Amines	
	Structure, Properties, Spectroscopy,	25.1-25.6
	Preparation of Amines	25.7
	Reactions of Amines	25.8, 25.11-25.16
	Trends in Basicity	25.9-25.10
	Special Topic: ***Examples of the " Click Reaction"***	
Week 10	**Carbon-Carbon Bond-Forming Reactions**	
	Organocuprates, Suzuki Reaction, Heck Reaction	26.1-26.3
	Carbenes and Cyclopropanes	26.4-26.5
	Olefin Metathesis	26.6
Week 11	**Carbohydrates**	
	Monosaccharides, hemiacetal and acetal functionality	27.1-27.7
	Reactions of monosaccharides	27.9-27.10
	Disaccharides	27.12
	Polysaccharides	27.14
	Special Topic: ***Aminoglycoside Antibiotics***	
Week 12	Special Topic II Submitted/Approved – Green Chemistry Award Paper	
	Amino Acids and Proteins	
	Amino acid characteristics and Syntheses	28.1-28.4
	Peptide sequencing and synthesis	28.6-28.7
	Protein structure	
	Special Topic: ***Enzyme Catalysis***	

Week 13	**Lipids**	
	Waxes, triacylglycerides, phospholipids	29.1-29.5
	Eicosanoids, Terpenes, steroids	29.6-29.7
	Special Topics: ***Biofuels***	
Week 14/15	**Exam III**	
	Project II Due – Description of a Green Chemistry Award	
	Polymers	
	Chain-growth polymers, natural and synthetic	30.1-30.5
	Step-growth polymers	30.6-30.7
	Green polymer synthesis and polymer recycling	30.8-30.9
	Course Review	