

Chem 335, Organic Chemistry II Syllabus, Fall 2007

<u>Instructor</u>	Dr. Brant Kedrowski
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Course Web Page	http://www.uwosh.edu/faculty_staff/kedrowsk/chem335.htm
Office Hours	M, W 10:20-11:20 am (HS-446); F 9:10-11:30 pm (HS-446); or by appointment
Lecture	M W F 12:40-1:40 (Albee 202)
Laboratory	All lab sections meet in HS-455 Sec 1: T 8:00-11:20 (with Dr. Samuel David, davids@uwosh.edu) Sec 2: T 1:50-5:10; Sec 3: Th 2:30-5:40 (with Brant Kedrowski)

Lecture Textbook, Solutions Manual, and Model Kit

- Janice Gorzynski Smith "Organic Chemistry" with Solutions Manual, 1st Ed., 2006, McGraw Hill, and a molecular model kit (Required)

Laboratory Books

- Chem 335 Organic Chemistry II Laboratory Manual, Fall 2007, (Required)
- Pavia, Lampman, Kriz, and Engel "Techniques in the Organic Laboratory, Microscale and Macroscale", Harcourt College Publishing. (Required)
- A Bound Notebook – Not Spiral. (Required, you can use one from a previous lab if it's in good condition)
- An acceptable pair of goggles for lab (Required)

Evaluation of Performance

<u>Lecture Portion of Course</u>		<u>Lab Portion of Course</u>	
Exam 1	20%	Online Lab Exercises in D2L	4%
Exam 2	20%	Notebook	2%
Exam 3	20%	Reports	10%
Exam 4	20%	End of Semester Lab Quiz	4%
Lecture total	80%	Laboratory total	20%

Evaluation will be based on the criteria listed above. This includes four hour exams covering material from lecture and the assigned reading in the Smith text, laboratory reports, online lab exercises, notebook, and an end of the semester lab quiz. The online lab exercises will be completed online through Desire-To-Learn (D2L) and graded electronically.

In calculating grades, I look for logical breaks in score distributions to set A, AB, B, BC, C, and D cut-offs. Clumps of students that have similar scores are assigned similar grades. As an *approximate* guide, I use the following percentages: A \geq 90%, B \geq 80%, C \geq 65%, D \geq 50%, with intermediate grades of AB, BC, and CD assigned to people near the borders. These percentages may be adjusted downward if I feel it's appropriate. The class will be kept updated on exam performance.

Laboratory

Organic laboratory and lecture complement each other. The lecture supplies fundamental theory about molecular and electronic structure, chemical reactions, and their mechanisms. In the laboratory you will put this knowledge into practice and learn supplementary theoretical concepts and mechanisms when necessary to help you more fully understand the chemical process in progress. Additional laboratory information is listed on pages 8-11. The following is a typical timeline to follow for each laboratory experiment:

1. **Prepare for Lab:** Look ahead in the syllabus and make sure you prepare for each upcoming experiment. Read each experiment thoroughly. Also read the assigned materials for each experiment in the Pavia and Smith books. There are no formal prelabs in this course, but you should take lab preparation seriously. It will help you work safely and efficiently in the lab.
2. **Notebook:** After the above reading, prepare your notebook as described in the Pavia text pages 26 and 27. During the lab, write all data and any observations in your notebook. Write out calculations in your notebook. Notebooks will be periodically checked throughout the semester.
3. **Complete Online Lab Exercise:** On D2L at <https://uwosh.courses.wisconsin.edu/> Log into Desire To Learn at the above address to access the list of quizzes for the course. You'll be able to access each exercise Monday-Sunday the week of the lab.
4. **Lab Report:** After completing the lab, answer the questions in the lab report form. Lab reports are due one week after the lab is completed. Be sure to turn in any other items specified in the lab report or by your instructor such as chromatographic printouts.

Course Policies and Study Hints:

1. **Unexcused Absences:** Attendance is required for all hour exams, the lab quiz, and all laboratories. As per department policy, two unexcused absences from lab will result in a grade of F for the course. An unexcused absence from an exam or quiz will result in no credit for that exam.
2. **Excused Absences:** The reason for any excused absence must be reported to your instructor (before the absence if possible), and substantiated in writing by the appropriate person (doctor, parent, etc...) Excused absences won't hurt your grade, provided you make arrangements to makeup the work in a timely manner.
3. **Tips for Success:** 1) Read the assigned material in the textbook, follow through solved problems, solve sample problems within the chapters; 2) Come to lecture and take notes; 3) Solve as many additional problems as possible.
4. **Practice Problems** are located in the lecture textbook at the end of every chapter. Work out an answer for each on your own before checking the "Solutions Manual". These problems won't be collected or graded, but you should take them seriously. Practice is the best way to become proficient at organic chemistry.
5. **Old Exams** from previous semesters are available for extra practice on the web at http://www.uwosh.edu/faculty_staff/kedrowsk/exams.htm. Please understand that course content often varies somewhat from semester to semester, so old exams may not perfectly mesh with the material covered this semester. See me if you have questions on which problems from old exams are relevant for a particular chapter in the current semester.
6. **Study Groups** work out very well for some people. I strongly encourage students to learn from each other as well as from me. However, if you do work in a group everyone must be participating equally. Simply copying someone else's answers for graded work is not allowed.

Lecture and Exam Schedule (Tentative)

We won't be covering all sections in all chapters. See below for a detailed description of which sections you are responsible for reading and a list of recommended end-of-chapter problems to work for practice.

Academic Week	Date	Key Concepts	Chapter: sections
1	9/5	Mass spectrometry	14: 1-4
	9/7	Infrared spectroscopy	14: 5-8
	9/10	NMR: theory, number of signals, position of signals	15: 1-4
2	9/12	NMR: strength of signals, spin-spin splitting	15: 5-7
	9/14	NMR: spin-spin splitting continued, other ¹ H NMR facts	15: 8-9
	9/17	NMR: solving unknowns, carbon NMR	15: 10-13
3	9/19	Oxidation and reduction: reduction reactions	12: 1-6
	9/21	Oxidation and reduction: oxidation reactions	12: 7-10, 12, 15
	9/24	Finish Chapter 12, problem solving and review day	
4	9/26	<i>Exam 1: Wednesday, Sept. 26 (chapters 14, 15, 12)</i>	
4	9/28	Radical reactions: halogenation of alkanes	13: 1-7
	10/1	Radical reactions: allylic halogenation, polymers	13: 8-12, 14, 15
5	10/3	Conjugation, resonance, conjugated dienes	16: 1-8
	10/5	Kinetic/thermodynamic products, Diels-Alder reaction	16: 9-12
	10/8	The Diels-Alder reaction continued	16: 13-14, 16
6	10/10	Benzene's structure and unusual stability	17: 1-6
	10/12	Criteria for aromaticity, examples of aromatic compounds	17: 7-8
	10/15	Molecular orbitals and the polygon rule	17: 9-10, 12
7	10/17	Finish chapter 17 and review	
	10/19	<i>Exam 2: Friday, Oct. 19 (chapters 13, 16, 17)</i>	
7	10/22	Halogenation, nitration, sulfonation reactions	18: 1-5
8	10/24	Friedel-Crafts reactions, substituted benzenes	18: 5-8
	10/26	Substituent effects continued, synthesis	18: 9-12, 14-16
	10/29	Carboxylic acids: naming, properties, preparation	19: 1-7
9	10/31	Carboxylic acids: reactions, and acidity	19: 8-15
	11/2	Carbonyl chemistry: reductions and oxidation	20: 1-5, 7-8
	11/5	Carbonyl chemistry: organometallic reagents, protecting OH	20: 9-12
10	11/7	Organometallic reagents cont., synthesis	20: 13A, 14,16-18
	11/9	Finish chapter 20 and review	
	11/12	<i>Exam 3: Monday, Nov. 12 (chapters 18, 19, 20)</i>	

11	11/14	Aldehydes and ketones: naming, properties, examples	21: 1-5
	11/16	Preparation, reactions, nucleophilic addition	21: 6-10
	11/19	Hydration, acetal formation, acetals as protecting groups	21: 13-15, 17-18
	11/21	Thanksgiving Break	
	11/23		
12	11/26	Carboxylic acids and their derivatives	22: 1-5
	11/28	Reactions of acid chlorides, anhydrides	22: 6-9
	11/30	Reactions of carboxylic acids, esters, and amides	22: 10-13
13	12/3	Summary of acyl substitutions, applications	22: 14-19
	12/5	Enols, tautomerism, and enolates	23: 1-5
	12/7	The aldol reaction	24: 1-4
14	12/10	Review of chapters 21, 22, 23, 24	
	12/12	<i>Exam 4, Wednesday, Dec. 12 (chapters 21-24)</i>	
	12/14	<i>Lab Quiz, Friday, Dec. 14 (given in lecture)</i>	

Recommended End-of-Chapter Problems

Chapter 14: 18-39, 40-42

Chapter 15: 31-60

Chapter 12: 27-29, 31-33, 35 a-l,k,l, 36 a-c, 37 a-d,g, 38 a-f,h, 39-42, 43 a-b, 44-45, 47-48, 52-54, 60

Chapter 13: 32-44, 45 a-e, i, 46 a,b (lower reaction in each only), 47-53, 55 a-d, g-h, 56 a,c-d, 57-63

Chapter 16: 26-55, 57

Chapter 17: 24-38, 40-51

Chapter 18: 34 a-j, 35-39, 40 b-f, 41-54, 56-57, 59-61

Chapter 19: 28-31, 32 a,b,d, 33 c, 34-57, 60-62

Chapter 20: 36 a-h,j-l, 37 a-h,j-l, 38 a-b,d-f, 39, 42 a-e, 43 c-d, 44 a-b, 45, 46 a-c, 47 a-f,h-i, 48 a-e,h, 49-50, 51 b, 52-57, 58 a-g, 59 a-i, 60-61,63-66

Chapter 21: 41-43, 44 a-e,h,j, 45 a-e,h,j, 46-48, 50 b,e-f,h, 51-52, 53, 55-59, 61, 62 a,d-f,h, 63 a, 64-66, 69-70, 75-77

Chapter 22: 43-53, 54 (Structures A-D, F, I-M), 55, 57, 59-62, 65-67, 68 a-e,g, 69-70, 73-76, 78-82

Chapter 23: 29-37, 52-53, 55

Chapter 24: 23-28, 40 a-c,e-f,h,m-n, 41 a-b,d-e,g, 42 (D-H), 46 a, 49 a,b, 50, 51 a

LABORATORY SCHEDULE

<u>Tues.</u>	<u>Thurs.</u>	<u>Complimentary Lecture Topic</u>	<u>Experiment Title</u>
	9/6	No lab	No lab
9/11	9/13	Reduction, IR, Alcohol Synthesis	Check in. Reduction of Heptanal Using Sodium Borohydride.
9/18	9/20	MS, IR, NMR	Spectral Identification of Organic Compounds.
9/25	9/27	Oxidation, Ketone Synthesis	Oxidation of Cyclohexanol to Cyclohexanone
10/2	10/4	Conjugated Systems	The Diels-Alder Reaction: Synthesis of 4-Cyclohexene- <i>cis</i> -1,2-dicarboxylic Anhydride
10/9	10/11	Aromatic Compounds	Isolation and characterization of Eugenol (essence of cloves)
10/16	10/18	Electrophilic Aromatic Substitution	Orientation in Electrophilic Aromatic Substitution: the Nitration of Toluene.
10/23	10/25	Aldehydes-Ketones and MS, IR, NMR	Qualitative Organic Chemistry. Identification of an Aldehyde or Ketone Unknown.
10/30	11/1	Spectroscopy	Qualitative Organic Chemistry. Identification of a General Unknown.
11/6	11/8	Organometallic Reagents	Preparation & Carbonation of a Grignard Reagent. Benzoic Acid.
11/13	11/15	Carbonyl chemistry	The Synthesis of <i>trans</i> -Stilbene using a Phase Transfer Wittig Reaction.
11/20	11/22	No lab	No lab
11/27	11/29	Carboxylic Acid Derivatives	Esters Found in Flavors and Fragrances: Synthesis of Isopentyl Acetate (Banana Oil)
12/4	12/6	Enolate Chemistry	Synthesis of 2 Methyl-2-pentenal. An Aldol Condensation.
12/11	12/13	Check Out	Check Out of Lab, Lab quiz, Friday 12/14, given in lecture