ORGANIC CHEMISTRY I: CHEMISTRY 350 SYLLABUS
FALL 2007

Classroom: SL118
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Required Text and Materials:
1) Text: "Organic Chemistry", 6th edition, by Wade
2) Solutions Manual: "Solutions Manual, Organic Chemistry, 6th Edition", by Simek, Wade

Test Schedule

Test #1:	Ch. 1 Introduction and Review
Friday, Sept. 21	Ch. 2 Structure and Properties of Organic Molecules
	Ch. 3 Structure and Stereochemistry of Alkanes
Test #2:	Ch. 4 The Study of Chemical Reactions
Monday, Oct. 22	Ch. 5 Stereochemistry
	Ch. 6 Alkyl Halides: Nucleophilic Substitution and Elimination
Test #3:	Ch. 7 Structure and Synthesis of Alkenes
Monday, Nov. 12	Ch. 8 Reactions of Alkenes
Test #4:	Ch. 10 Structure and Synthesis of Alcohols
Friday, Dec. 7	Ch. 11 Reactions of Alcohols

Final Exam Comprehensive Tuesday, December 18 12:00

Grading Summary:

Tests	400 points (4 x 100)
Final exam	150 points (1 x 150)
Take-Home Quizzes	60-80 points? (6-10 of these?)
+10 points extra credit possible for perfect attendance	

Tentative letter grades

A	90%
B	78%
C	66%
D	54%

THE INSTRUCTOR MAY LOWER BUT WILL NOT RAISE THE PERCENTAGE REQUIRED FOR A LETTER GRADE

Jasperse website: http://www.mnstate.edu/jasperse/
This will include copies of:
- Handouts/notes/in-class practice problems
- quizzes
- practice tests and practice text answers

Final Exam: The final exam will be **cumulative**, covering all of the same material tested previously on Tests 1-4.

Take-Home Quizzes: I will assign a number of take-home "quizzes" (maybe 7-10 over the course of the semester?) These will normally be given out at least four days before they are due.

Homework and Study Strategy: All assigned book problems represent what I consider to be reasonable test-level problems. All have worked-out answers in the Solutions Manual. **The homework is a great way to practice problem solving, assess your progress, and prepare for tests.** Since solutions are available, I will not collect the book homework. **The few take-home quiz problems that I collect and grade are no substitute for doing book homework problems!**

Note: Putting off the extensive information in organic chemistry till the week of a test will only make it harder on you. After each class, try to work all of the assigned book problems at the back of the

sections covered so that you will not only understand what you are doing at the time, but will remember how to do it weeks later! After each chapter is completed in class, do all of the assigned end-of-chapter problems in the book.

- A copy of the solutions manual is on reserve in the library, CHE-195.
- A copy of the textbook is on reserve in the library, CHE-207.

Attendance: Faithful attendance is important (and I do care if you come!) To reinforce your self-discipline, perfect attendance will be rewarded with 10 points of extra credit and a single absence with 5 points of extra credit. I will excuse absences at my discretion if the reason is good (illness or school events) and I am notified. Be sure to sign the attendance sheet each day!

Class E-Mail List

An email list will be used to notify you of special scheduling information or other miscellany. (If I am sick and won't be able to hold class; when and where practice tests are to be held; if there are errors in one of the practice tests or book problems or in something I communicated in class, etc.) The list uses your official mnstate e-mail address. If that isn't what you actually use, contact Jerome Fuchs (fuchs@mnstate.edu) and request that he set up a forwarding protocol so that e-mails to your mnstate.edu account actually get forwarded to the actual account you use.

- Note: A test e-mail has already been sent. If you haven't received one, something needs correction.

Course Description CHEM 350 Survey of Organic Chemistry: Part I (3 credits)
Introduction to the classification, structure, reactions, and reaction mechanisms of carbon compounds. **Prerequisite:** Chem 210

- Note: Organic Chemistry Laboratory I, Chem 355, is a related but separate class. It is not required, but if you want to be in the lab you must be registered for it.

Student Learning Outcomes/Course Objectives

The general outcome goals are that students will understand the classification, structure, nomenclature, reactions, reaction mechanisms, and synthesis of carbon compounds including halocarbons, alkenes, and alcohols. A general summary of major learning topics is summarized on page 1, with the listing of chapters that will be covered. A more detailed list of learning topics is summarized on page 5, with an approximately day-by-day listing of topic coverage. Most of the learning outcomes will be assessed by problems in which students must demonstrate their understanding. The list of problems on page 3 represents a detailed and representative sampling of the types of problems that should be solvable by a student who has achieved the learning outcomes.

For a correlation of class coverage of **NCATE standards**, see the NCATE SYLLABUS APPENDIX on page 5.

Academic Honesty

Cheating will not be tolerated and will be reported to the Dean of your College and the Vice President for Academic Affairs. It may also be reported to the Student Conduct Committee for further disciplinary action. For a full description of the MSUM Academic Honesty Policy, please see the Student Handbook. (http://wwwmnstate.edu/sthandbook/POLICY/index.htm)

Special Accommodations Students with disabilities who believe they may need an accommodation in this class are encouraged to contact Greg Toutges, Coordinator of Disability Services at 477-5859 (Voice) or 1-800-627-3529 (MRS/TTY), CMU 114 as soon as possible to ensure that accommodations are implemented in a timely fashion.

Textbook website: http://wps.prenhall.com/esm_organic_wade_6 The textbook website has additional practice problems, practice exams, visualization helps, and links to other useful web-based study resources. But **you have to pay for access**.

CHEMISTRY 350 PROBLEMS

FALL 2007 Dr. Craig P. Jasperse

Ch	In Chapter Problems	End of Chapter Problems
1	1(Si only), 2a-f, 3a-g, 4, 5a-c, 6(all!), 7a,b,d,e,g, 8a,e,f,g,h, 9, 10d-h, 11, 15, 17a, 18a-c, 19a-f [determine which is the "nucleophile" (electron pair donor) and which is the "electrophile" (electron pair receiver), and draw the arrows to show bond making and breaking. Do not do the "Bonsted-Lowry" discussion.]	21, 23, 25-29, 31, 32, 34-37, 40-43, (for 42 and 43, you should be able to process H_2SO_4 by memory, the others by structure without needing to look at a list of acidity values), 44 (use nucleophile/electrophile designation, and definitely practice the arrow pushing), 46
2	1b (draw), 2 (skip part about 104.5˚ angle as opposed to 109˚ angle), 3, 4, 5a-f, 7a,b, 8, 9, 10 (three do, three don't; beware of "e", which is deceptive), 11, 16, 17 (omit a), 18-20, 21 (skip d), 22 [Note: for functional group problems, skip the "cyclic" designation!]	27, 28, 29 (we will see this is crucial to the performance of all proteins!), 30, 31, 33-35, 38-40, 41 (skip c), 42, 44
3	1a, 2a, 3, 4a-e, 5, 6a,b, 7a,b, 9a, 11- 13, 15b-d, 16, 17a,b, 18-21, 25-29	33, 34 (omit c and d), 35 (omit b), 37 (omit e,g,h), 38, 39, 40b, 42, 43a,b, 44, 46
4	1a-c, 2, 3, 4a, 9a, 11-13, 15, 16, 18, 19a-d, 24, 25, 28-32.	35-39, 41, 42a, 43, 44, 46 (skip d) (Be Sure to do 46, very important)
5	2 (label as chiral or achiral. If chiral, also draw the enantiomer.), 3 (star chiral C's, identify each chiral molecule, and be able to draw the enantiomers.), 4, 5 (assign as chiral or achiral), 6 [skip f,g. For all others, give the (R)/(S) designations.], 14, 20a-e, 21 (skip f), 22, 23c	26a,c,d,j-p , 27, 30d, f-h 31a, f-i, 36
6	1, 2c,e,f, 3 (parts 1 and 3, don't classify B or name k), 6, 7 (the density of chloroform is 1.50), 8a, 10 S_N2 Reactions: 11-13, 14a,b,d,e, 15(skip b,g), 16, 18 (skip neopentyl bromide. And, substitution is more important than leaving group), 19a,b, 20(skip c,e,f), 21 [(the catch here is to understand why inversion can occur if (S) goes to (S)] S_N1 Reactions: 22, 23, 24, 25, 26 (skip the mechanisms, but note how rearrangement forms a more stable cation), 27, 29 (very interesting. Probably not test fodder.) Elimination reactions: 30, 31, 32, 33b-d, 34-39, 40	42a,c-e, 43a-c,e,f, 44**, 45("solvolysis" is substitution by solvent, and is always S_N1), 46, 48-54, 56, 59-61

Ch	In Chapter Problems	End of Chapter Problems
7	1 (for b, counting geometric isomers, I count 14 possible alkene isomers and 15 possible cyclic isomers! The answer book only shows a few of the possibilities.), 4, 5a,b,c,f,g,h, 6a,d,e, 7a,c,e(name is ambiguous), 8a,c,e, 10a-d (more stable only. Skip the part about how much difference in energy), 12a,c, 13, 16, 17, 18, 19, 24, 25, 27-29 (note: in 28a, 29c,d cation rearrangements occur. I won't ask for mechanisms with cation rearrangement on your test, but a simple elimination of H_2O such as 29b or c is extremely likely.)	31, 32a,b,d, 33, 34 (for part c: how many rings does it have?), 36a-c, 38 (try to predict the major product. For test purposes I usually wouldn't want the minors), 39a,b,d (the point is to predict the major product), 44, 45
8	1-4, 6, 8-11, 13-21(look at answer to e, just for interest sake), 22 (for b, book answer is poor. Should use a hindered base), 23, 24, 29, 30 (mech for ring-opening only), 32b,d, 33, 34b,d,f, 35 (d,l means racemic mix of chiral products), 36, 37	47 (good practice for "predict the product" reactions.), 48a, b, c,e,f 49a,b,c,d,e,f,h, 50a-l, 55, 58-61, 68
10	1, 5d, 6, 8, 10, 12a,b,d, 13-16, 17 (esters only), 18-20, 22-26	31, 33a-d, 34b,c, 35a,c, 36b,c, 37 (review from chapter 8), 38a-l, 39, 40, 42, 43
11	1a,b,d, 2, 3, 5 (skip $KMnO_4$), 6, 9, 10, 11, 12a, 13, 14, 22, 23, 27a,b, 33, 34, 35, 36, 37, 38	40 (do the bromides only), 41 (skip g), 42, 43, 44, 48a, b, c, f, g, h, 49, 50, 52, 53, 56
8	1-4, 6, 8-11, 13-21(look at answer to e, just for interest sake), 22 (for b, book answer is poor. Should use a hindered base), 23, 24, 29, 30 (mech for ring-opening only), 32b,d, 33, 34b,d,f, 35 (d,l means racemic mix of chiral products), 36, 37	47 (good practice for "predict the product" reactions.), 48a, b, c,e,f 49a,b,c,d,e,f,h, 50a-l, 55, 58-61, 68
7	1 (for b, counting geometric isomers, I count 14 possible alkene isomers and 15 possible cyclic isomers! The answer book only shows a few of the possibilities.), 4, 5a,b,c,f,g,h, 6a,d,e, 7a,c,e(name is ambiguous), 8a,c,e, 10a-d (more stable only. Skip the part about how much difference in energy), 12a,c, 13, 16, 17, 18, 19, 24, 25, 27-29 (note: in 28a, 29c,d cation rearrangements occur. I won't ask for mechanisms with cation rearrangement on your test, but a simple elimination of H_2O such as 29b or c is extremely likely.)	31, 32a,b,d, 33, 34 (for part c: how many rings does it have?), 36a-c, 38 (try to predict the major product. For test purposes I usually wouldn't want the minors), 39a,b,d (the point is to predict the major product), 44, 45

		Chemistry 350, Jasperse, Fall 2007	Reading
Class	Date	Topic	Assignment
1	Aug. 27	Intro. Octet Rule, Lewis Structure, Electroneg, Polarity, Formal Charge	1.1-1.6
2	Aug. 29	Resonance; Structural Formulas; Acids/Bases, Electrophiles/Nucleophiles	1.7-1.14
3	Aug. 31	Orbitals, π-Bonds, Hybridization + Shape; Drawing 3-D Shapes	2.1-2.6
	Sept. 3	Labor Day Holiday	No Class
4	Sept. 5	Bond Rotation, Isomerism, Polarity, Intermolecular Forces, Solubility	2.7-2.11
5	Sept. 7	Classification of Organic Compounds. The Functional Groups.	2.12-2.14
6	Sept. 10	Classification, Formulas, Physical Properties, Nomenclature of Alkanes	3.1-3.5
7	Sept. 12	Conformations and Stability of Acyclic Alkanes and Cycloalkanes	3.6-3.12
8	Sept. 14	Conformations and Stability of Cyclohexanes	3.13-3.16
9	Sept. 17	Alkane Chlorination. Factors to Think About in a Chemical Reaction.	4.1-4.9
10	Sept. 19	Transition States, Multistep Reactions, Halogenation of Higher Alkanes.	4.10-4.14
11	Sept. 21	Test 1. Chapters 1-3.	Test
12	Sept. 24	Reactive Intermediates (Radicals, Cations, Anions)	4.15-4.16
13	Sept. 26	Chirality, R/S Classification of Chiral Carbons.	5.1-5.3
14	Sept. 28	Miscellaneous Stereochemistry	5.4-5.9
15	Oct. 1	Diastereomers; More than One Chiral Carbon	5.11-5.16
16	Oct. 3	Catchup	Catchup
17	Oct. 5	Nomenclature, Structure, Properties, Reactivity of Alkyl Halides. Skip 5.10	6.1-6.7
18	Oct. 8	The Sn2 Substitution Reaction.	6.8-6.12
19	Oct. 10	The Sn1 Substitution Reaction.	6.13-6.16
20	Oct. 12	The E1 and E2 Elimination Reactions. Substitution vs. Elimination?	6.17-6.21
	Oct. 15	Fall Breather	No Class
21	Oct. 17	Catchup	Catchup
22	Oct. 19	Alkenes: Structure, Nomenclature, Isomers.	7.1-7.6
23	Oct. 22	Test 2. Chapters 4-6	Test
24	Oct. 24	Alkene Stability; Synthesis.	7.7-7.10
25	Oct. 26	Synthesis of Alkenes; Classifying/Recognizing Reaction Mechanisms; Alkenes Skip 7.11	7.10-8.2
26	Oct. 29	Addition of H-Cl, H-Br, and H-OH to Alkenes.	8.1-8.5
27	Oct. 31	Oxymercuration/Dermercuration; Hydroboration/Oxidation; Hydrogenation	8.5-8.7,8-10
28	Nov. 2	Addition of Halogens, Formation of Halohydrins; Epoxidation Skip 8.11	8.8-8.9
29	Nov. 5	Oxidation Reactions of Alkenes	8.12-8.16
30	Nov. 7	Catchup; Practice Problems	Catchup
31	Nov. 9	Structure, Nomenclature, Properties, Weak Acidity of Alcohols Skip 8.16	10.1-10.6
32	Nov. 12	Test 3. Chapters 7,8	Test
33	Nov. 14	Synthesis of Alcohols; Organometallic Reactions	10.7-10.9
34	Nov. 16	Side Reactions; Reduction of Carbonyl Compounds Skip 10.12	10.10-10.11
35	Nov. 19	Catchup; Practice Problems	Catchup
36	Nov. 21	Thanksgiving Break	No Class
37	Nov. 23	Thanksgiving Break	No Class
38	Nov. 26	Oxidation of Alcohols	11.1-11.3
39	Nov. 28	Conversion of Alcohols to Tosylates or Halides; Uses of Tosylates and Halides	11.5-11.9
40	Nov. 30	Miscellaneous; Multistep Synthesis	11.10, 11.14
41	Dec. 3	Catchup, Multistep Synthesis Problems	Catchup
42	Dec. 5	Review for Test 4	---
43	Dec. 7	Test #4 Covering Chapters 10,11 Skip 11.4, 11.11-13	Test
44	Dec. 10	Practice Test for Final, As Much as Time Permits	
	Dec. 18	Final Exam. 12:00 TUESDAY	Final Exam

Tentative Letter Grades:
A: 90%
B: 78%
C: 66%
D: 54%

Subject Matter Standards for Teachers of Chemistry	***Knowledge/ Understanding***	***Practice/ Application***	***Assessment***
B.(1)(d) predict the shape of a given molecule using existing models including the Valence Shell Electron Pair Repulsion Theory;	Class Day 3 Chapter 2 Handouts	Class Day 3 Chapter 2 Handouts Chapter 2 Homework Test 1 Practice Tests	Quiz 2 Chapter 2 Homework Test 1 Final Exam
B.(5)(b) describe the functional groups and polarity of the molecule of a given organic compound using words, structural and chemical formulas, and physical and computer models;	Class Day 4-6 Chapter 2 Handouts	Class Day 4-6 Chapter 2 Handouts Chapter 2 Homework Test 1 Practice Tests	Quiz 2 Chapter 1 Homework Test 1 Final Exam
B.(5)(c) describe a given hydrocarbon compound as aromatic or aliphatic, saturated or unsaturated, alkanes, alkenes or alkynes, and branched or straight chains (as described above);	Class Day 5-8, 11, 23 Chapter 2, 3, 7 Handouts	Class Day 5-8, 11, 23 Chapter 2, 3, 7 Handouts Chapter 2, 3, 7 Homework Chapter 1 Practice Tests	Quiz 2 Chapter 2, 3, 7 Homework Test 1 Final Exam
B.(5)(d) explain and predict the outcomes of reactions of given aromatic, allylic and conjugated alkenes and other delocalized electron systems using a molecular orbital model of the pi-bond;	Class Days 27-31 Chapter 8 Handouts	Class Days 27-31 Chapter 8 Handouts Chapter 8 Homework Test 3 Practice Tests	Quiz 8 Chapter 8 Homework Test 3 Final Exam
B.(5)(e) explain and predict the reactivity, solubility, melting point and boiling point of an organic compound using functional groups, structure and polarity;	Class Day 4 Chapter 2 Handouts	Class Day 4 Chapter 2 Handouts Chapter 2 Homework Test 1 and 4 Practice Tests	Quiz 2 Chapter 1 Homework Test 1 and 4 Final Exam
B.(5)(f) predict the structure of an organic molecule using infrared, nuclear magnetic resonance and mass spectra;	Class Day 4 Chapter 2 Handouts	Class Day 4 Chapter 2 Handouts Chapter 2 Homework Test 1 Practice Tests	Quiz 2 Chapter 2 Homework Test 1 Final Exam
B.(5)(h) describe the origin of optical activity of a given chiral organic compound using words, diagrams, structural and chemical formulas and physical and computer models;	Class Day 15 Chapter 5 Handouts	Class Day 15 Chapter 5 Handouts Chapter 5 Homework Test 2 Practice Tests	Quiz 5 Chapter 5 Homework Test 2