

# CHEMISTRY 360 SYLLABUS

Spring 2006

## Organic Chemistry II

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Office Hours: Mon 10-1, 3-5

Tues 10-12

Wed 10-1

Required Text and Materials:

Classroom: SL118

1) Text: "Organic Chemistry", 6th edition, by Wade

2) Solutions Manual: "Solutions Manual, Organic Chemistry, 6th Edition", by Simek, Wade

### Test Schedule

Test #1 (100 pts)

Friday, Feb. 10

Ch. 15 Conjugated Systems and Orbital Symmetry

Ch. 16 Aromatic Compounds

Ch. 17 Reactions of Aromatic Compounds

Test #2\* (50 pts)

Friday, Feb. 24

Ch. 13 Nuclear Magnetic Resonance Spectroscopy

Ch. 12 Infrared Spectroscopy

Test #3 (100 pts)

Monday, April 3

Ch. 18 Ketones and Aldehydes

Ch. 22 Alpha Substitutions and Condensations of Enols and Enolate Ions

Test #4 (100 pts)

Monday, May 1

Ch. 19 Amines

Ch. 20 Carboxylic Acids

Ch. 21 Carboxylic Acid Derivatives

Final Exam (150 pts)

Wednesday, May 10

Comprehensive (Standardized American Chemical Society Exam,

9 am

Covers Entire Year of Chemistry!!)

### Grading Summary:

Tests

350 points

Final exam

150 points

Homework/Quizzes ??? (not many)

(+10 points extra credit possible for perfect attendance)

### Tentative letter grades

A  $\geq 89\%$

B  $\geq 77\%$

C  $\geq 65\%$

D  $\geq 52\%$

The instructor may lower but will not raise the numbers required for a letter grade.

Attendance: Perfect attendance will be rewarded with 10 points of extra credit and a single absence with 5 points of extra credit. Be sure to sign the attendance sheet each day!

Final Exam: The final exam will be cumulative, covering the entire year of organic chemistry. The test is a standardized test produced by the American Chemical Society, taken by thousands of students at schools throughout the country to assess outcome knowledge of organic chemistry. It is useful for comparison to other students at other schools.

Jasperse website: <http://www.mnstate.edu/jasperse/>

This will include copies of practice tests, handouts, quizzes, and old notes.

Homework/Quizzes: All assigned book problems are representative of what I consider to be reasonable test-level problems, and have worked-out answers in the Solutions Manual. The homework is a fun way to practice problem solving, assess your progress, and prepare for tests. Since solutions are available, I will not collect the book homework. I may give some quizzes as time permits and need demands. 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! Do all of the assigned end-of-chapter problems as soon as a chapter is completed in class.

### **Final Exam and Grading**

The final exam will involve 70 problems, but your score will not be determined in the normal percentage way. (In other words, you don't need to get 89% correct in order to get an A...). Your raw score will be compared to national averages, and converted into a percentile format. For example, 52/70 may be 74%, but may be 90<sup>th</sup> percentile, and would be viewed as an A. Essentially I will use your raw score, convert that into percentile score relative to national norms, then use a formula to convert that back to a letter grade equivalent, and scale it all up to be worth 150 points. Bottom line: it will be fair and the class grade distribution/curve will be comparable to on regular tests.

### **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; or when and where practice tests are to be held; or if there are errors in one of the practice tests or book problems or in something I communicated in class, etc..) If you have not already received an e-mail indicating that your address is already on the list, please send an email to [jasperse@mnstate.edu](mailto:jasperse@mnstate.edu) and title it "Please add me to Chem360 email list" or something like that...

### **Course Description**

CHEM 360 Survey of Organic Chemistry: Part II (3 credits)

The structure, nomenclature, reactions, reaction mechanisms, and synthesis of carbon compounds that contain oxygen and nitrogen. **Prerequisite:** Chem 350

Note: Organic Chemistry Laboratory II, Chem 365, 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 structure, characterization, nomenclature, reactions, reaction mechanisms, and synthesis of carbon compounds including those that contain oxygen and/or nitrogen. 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 4, 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 all the learning outcomes.

### **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://www.mnstate.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.

**CHEMISTRY 360 PROBLEMS  
SPRING 2006**

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Scheduled Office Hours:

Ch	In Chapter Problems	End of Chapter Problems
15	1, 2, 4, 5, 6, 7(skip c), 9, 10-11(NBS=Br <sub>2</sub> /hv), 12, 13, 14, 15 (skip d), 16 (ignore stereochem), 18	24, 25a-d,g-i, 26, 27, 30, 31, 33a-f
16	3(skip cyclooctatetraene), 5, 7b-d, 8, 9a, 10, 11, 12, 15, 16 (purine picture on top of page), 18, 22a, c,e,g, 24	27a-f, 28a-c,e,f, 29, 32, 34 (hint: N lone pairs are strongly basic when sp <sup>3</sup> or sp <sup>2</sup> but weakly basic when p), 35, 36, 37 ("xylene" means dimethyl benzene), 43
17	2, 4(p-xylene is 1,4-dimethylbenzene), 6, 7, 8, 9, 12a, 14, 15, 16b(i-iv), 17a,c, 20a-c, 21, 22(skip c,d), 33, 34 (1), 36, 37	44a,b,d,f,h,j,l, 45, 46a,b,e,f,g, 47b-f,h,i,j,l, 48, 49, 51, 57, 60, 61
13	2, 3, 4, 5, 6, 7, 9, 11, 13a, 15, 16, 18, 22, 24a-e, 25, 27, 29, 30, 32	33, 34, 35 (skip d), 36, 38, 39, 40, 41, 43, 44, 49
12	4, 5	16
18	1a,b, 6, 7, 8, 9, 10, 11a,b, 12, 16, 17, 18a, 19, 21, 22, 24, 25, 26, 27a,b,d, 28, 29, 30, 31, 32, 33, 34a-d, 35a-c, 37a-c	39a-c, e-g, l, 40, 43, 44, 49, 50, 51a-f,h, 52, 56a-g, i-l, 57, 58,59, 61a-e, 64a-d, 65, 66
22	(Enols, Halogenation) 1, 2, 3, 4, 5, 6, 8a,c,d, 9b,d,e, (LDA alkylation) 13, (Aldol) 18, 19, 22, 23, 24, 25, 26, 27, 28, 29, 30,32, (Claisen) 34a, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, (alkylation-decarboxylation) 46, 47, 49, 50, (Michael) 55, 56, 57, 59	61, 62, 63, 64, 65, 66, 67, 68 (skip e), 69a, d, e, 70, 71, 73a-c
19	1,2(skip b,d), 3a-c, 5b,c, 6a-c, 15, 16, 17, 25b,d,f,g, 26, 27, 28, 30a-c, e-g, 31	36a-e, 37, 39a,c,d, 41a,b,h,i, j,l,m, 42 (skip e), 44a,d,g, 47, 48, 50a-c, 51a,c
20	1b-d,g, 2a-c, 3, 4, 5, 6, 11 b,c,d,f, 12, 13, 15b,c, 16a,b, 18, 19, 20, 21, 23, 24	26 (not d,g, i), 28a,e,f,h,i, 29 (skip b), 30a,d,e, 31, 32a,c,d, 33, 35a-e,i,j,k, 36a-c,e,f, 37, 38, 39, 41, 42, 43, 47, 48, 49, 50
21	1a-c, 6-14,16, 18, 31, 32a,b	44a,c,d,e,f, 45, 46, 47a,e,f, 48a,b, 49a,b,d, e, 50a,b,c,e,f,g,h, j, l, 51, 54a,c,d,f,j, 55, 57a-c

Chemistry 360, Jasperse, Spring 2006		Reading Assignment
Date	Topic	
11-Jan	No Class	-
13-Jan	Intro; Conjugation, Molecular Orbitals, Dienes, Allylic Cations, Additions to Dienes (15-3 will be covered only very briefly; skim briefly)	15.1-6
16-Jan	No Class. Martin Luther King Day.	no class
18-Jan	More allylic cations/radicals/conjugation and Applications; Diels-Alder Reaction	15.7-11
20-Jan	Diels-Alder Reaction; Aromaticity (Skip "endo rule" section in 15.11A, p. 684; Skip 15.12,13)	15.11, 16.1-2
23-Jan	Aromaticity; Huckel's Rule and Complex Aromatics	16.1-7
25-Jan	Complex Aromaticity, Application, Nomenclature	16.8-11, 13
27-Jan	Electrophilic Aromatic Substitution: Intro, Mech, Kinetic Effects, Directing Effects (Skip 16.11,14,15)	17.1,6-8
30-Jan	Reactions in Detail: Halogenation, Nitration, Sulfonation, Alkylation, Acylation	17.2-5,10,11
1-Feb	Catchup; Addition to Disubstituted Benzenes; Synthetic Applications	17.9, Practice
3-Feb	Side Chain Reactions; Retrosynthesis; Synthetic Applications; Practice (Skip 17.12,13,15)	17.14, Practice
6-Feb	Catchup	-
8-Feb	Integrated practice problems	-
10-Feb	Test #1 Covering Chapters 15-17.	Test 1
13-Feb	<sup>1</sup> H NMR Overview: Chemical Shift, Integration, and Splitting; <sup>1</sup> H NMR Problem Solving	13.5-8
15-Feb	<sup>1</sup> H NMR Problem Solving	13.5-8
17-Feb	More Problem Solving; Complex Splitting; Stereochemical Nonequivalence of Protons (Focus on 13.5-8, 12-13; Skim 13.1-4, 9, 10; Skip 11, 14)	13.9-10
20-Feb	<sup>13</sup> C NMR; Infrared Spectroscopy	13.12-13; 12.11-12
22-Feb	Spectroscopy Catchup, Integrated Problems	catchup
24-Feb	Test #2 Covering Chapters 12-13. 50 points.	Test 2
27-Feb	Ketones/Aldehydes. Nomenclature, Properties, Intro.	18.1-7
1-Mar	Synthesis of Ketones/Aldehydes.	18.7-11
3-Mar	Reactions of Ketones/Aldehydes (Skip 18.13, for now.... )	18.12, 14-17
6-Mar	Reactions of Ketones/Aldehydes	18.18-19
8-Mar	Reactions of Ketones/Aldehydes	18.20-21
10-Mar	Enols and Enolates Intro. Acid/Base Considerations; Proton as Electrophile (Skip 22.4,6)	22.1-2, 22.15
13-Mar	Spring Break	-
15-Mar	Spring Break	-
17-Mar	Spring Break	-
20-Mar	Halogenation; Alkylation; Double Activation; Ester Hydrolysis; Decarboxylation	22.3, 5, 15-17
22-Mar	The Aldol Reaction (Aldehyde/Ketone as Electrophile)	22.7-11
24-Mar	Catchup; Claisen Reaction (Ester as Electrophile) (May skip 22.18-19 pending time...)	22.12-17
27-Mar	Michael, Robinson Reactions (Enones as Electrophile)	22.18-19
29-Mar	The Wittig Reaction; Catchup	18.13
31-Mar	Catchup. Amines.	Catchup
3-Apr	Test #3 Covering Chapters 18 and 22.	Test 3
5-Apr	Amines. Intro, Nomenclature, Properties; Basicity of Amines; Structural Factors; Salts	19.1-7
7-Apr	Reactions of Amines (Skip 19.8-9,14-16,24-25)	19.10-13, 17-18
10-Apr	Diazonium Chemistry; Amine Synthesis by Reductive Amination of Carbonyls	19.17-19
12-Apr	More Synthesis of Amines	19.19
14-Apr	No Class, Good Friday	-
17-Apr	Carboxylic Acids: Nomenclature; Properties; *ACIDITY*; Salts; Soap; SYNTHESIS	20.1-5
19-Apr	Acid Synthesis; Reactions	20.8-11
21-Apr	Reactions of Acids: Nucleophilic Acyl Substitution; Carboxylic Acid Derivatives (Skip 20.6,7,12)	20.13-15; 21.1-3
24-Apr	Interconversions Among Acids and Derivatives; Synthesis and Mechanism; Catchup	21.5-7
26-Apr	Interconversions Among Acids and Derivatives; Synthesis and Mechanism; Catchup	21.5-7
28-Apr	Practice Problems (Skip 21.4)	-
1-May	Test #4 Chapters 19-21	Test 4
3-May	Significant Special Topics; Preview of ACS Final Exam; Course Evaluations	Practice
10-May	Final Exam, 9 a.m., Wednesday	Final Exam

