ORGANIC CHEMISTRY I: CHEMISTRY 350- SYLLABUS

Online Class - Summer 2018 –
11-week session (formally listed start May 16, Course ID = 000106, CHEM360-02)
8-week session (formally listed start Jun 5, Course ID = 000107, CHEM360-03)
Either section can be started as far in advance as you like.

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ORGANIC CHEMISTRY I ONLINE SUMMER: CHEMISTRY 350-SYLLABUS

Online Class - Summer 2018 – 11-week (starts May 16, Course ID = 000106, CHEM360-02) or 8-week (Jun 5, Course ID = 000107, CHEM360-03) Sessions

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Course Description: **CHEM 350. Organic Chemistry I. 3 Credits**. Introduction to the classification, structure, reactions, and reaction mechanisms of carbon compounds. Prerequisites: CHEM 210 (General Chemistry II).

Required Text and Materials:

1) Text: "Organic Chemistry", 8th edition OR 7th edition OR 6th edition, by Wade (Note: if you have a different Wade edition, or a version of Carey's Organic Chemistry **as used at NDSU**, contact me in order to use what you have.) Note: These aren't the newest versions, so you can buy used ones cheap on-line. See website for Amazon links to cheap copies: http://web.mnstate.edu/jasperse/Required%20Text%20and%20Materials.pdf

2) Solutions Manual: "Solutions Manual, Organic Chemistry." Get the edition that matches the textbook edition you buy. (In other words, if you have 8th edition test, make sure you get the 8th edition solution manual, etc.)

3) Online "Sapling" homework. http://www2.saplinglearning.com

Test Schedule

Test #1 (100 pts)	Ch. 1 Introduction and Review Ch. 2 Structure and Properties of Organic Molecules Ch. 3 Structure and Stereochemistry of Alkanes
Test #2* (100 pts)	Ch. 4 The Study of Chemical Reactions Ch. 5 Stereochemistry Ch. 6 Alkyl Halides: Nucleophilic Substitution and Elimination
Test #3 (100 pts)	Ch. 7 Structure and Synthesis of Alkenes Ch. 8 Reactions of Alkenes
Test #4 (100 pts)	Ch. 15 Conjugated Systems and Orbital Symmetry Ch. 16 Aromatic Compounds Ch. 17 Reactions of Aromatic Compounds

Grading Summary:		Tentative letter grades	
Tests 1-4	400 points (4 x 100)	A/A-	≥90%
Take-Home Quizzes	27 points	B-/B/B+	≥80%
On-Line Homework	73 points (prorated)	C-/C/C+	≥70%
No cumulative final	500 Points Total	D-/D/D+	≥56%

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

Jasperse website: http://web.mnstate.edu/jasperse/Online/chem350online-Summer.htm This will links to:

Notes for use in class	Recorded Lectures	Sapling	Quizzes
Practice Tests	Jasperse Schedule	Textbook Info	Miscellaneous

On-line "Sapling" homework Problems: You will be required to buy access to an on-line homework system (see later page in syllabus for details.) These problems will be computer-graded, will give you some practice and sometimes tips, and will help to keep you from procrastinating.

Student Learning Outcomes/Course Objectives: The course is designed for science majors, including chemistry and biology majors, and including those preparing for health professions.

Coverage includes nomenclature, structure, properties, and the synthesis, reactions, and reaction mechanisms of alkanes, alkyl halides, alkenes, aromatics, and conjugated systems. Stereochemistry is covered. Reaction types covered include radical halogenation, S_N2 and S_N1 substitutions, E2 and E1 eliminations, addition reactions to simple alkenes and conjugated dienes, Diels-Alder reactions, and aromatic substitution reactions. Reaction mechanisms are emphasized. Synthesis design and retro-synthesis are emphasized. Structure, stability, stability-reactivity principles, acid-base chemistry, nomenclature, resonance, conjugation, and aromaticity among many other topics, are addressed.

Schedule: Which Lecture Videos and Practice-Set Videos Go with Each Test

Organic Chemistry 1, Jasperse, Wade Version 8 (43 class days, 39 lectures)
Other version of Wade, or other textbooks:
http://web.mnstate.edu/jasperse/Chem350/Other-Textbooks.html

Video	Topic	Reading Assignment
	TEST 1 LECTURES	
1	Intro. Why Carbon is Special, Normal bonding, Lewis Structures in Organic	1.1-1.6
2	1. Normal Bonding. 2. Formal Charge and Abnormal Bonding. 3. Electronegativity	**1.7**, 1.4-1.8
3	1. Structural formulas: Full, Condensed, and Skeletal 2. Resonance Structures	1.9-1.12
4	1. Mechanism/Arrow-pushing. 2. Acid-Base Chemistry. 3. Anion Stability Patterns.	**1.13**-14
5	VSEPR 3D Shape. Drawing 3D; Hybridization; Pi bonds; Isomers,	2.1-2.8
6	Polarity IMF, Boiling Points, Solubility. Catchup. Functional Groups	2.9-2.11
7	Functional Groups. Alkane Nomenclature	2.12-2.14
8	Alkane Nomenclature. Newman Projections; Torsional and Steric Strain; Cycloalkanes	3.1-3.9
9	Cyclohexane Chairs, Cis-and-Trans, Structural Isomers	3.9-3.15
10	Catchup/Practice. First 38 minutes of video 10.	
	Additional Practice Sets/Videos: Mechanism Practice; Acid-Base Practice; 3D-Drawing Practice; Newman Projection Practice; Cyclohexane Practice	
	Test 1 Practice Tests: V1, V2, V3, V4	
	TEST 2 LECTURES	
10	Radical Halogenation; Mechanism; Radicals; Bond Energies; Reaction Energies. Last 12 minutes of Video.	4.1-4.7
11	Rate Laws, Transition States, Stability-Reactivity Principles	4.7-4.13
12	Radical Brominations. Major product, mechanism, structure isomers. Stability patterns for carbon radicals, cations, and anions.	4.13-4.16
13	Chiral vs achiral, Enantiomers, Recognizing/Drawing Mirror Images.	5.1-5.3
14	Chiral Carbons; Attachment Priorities; R/S Designation; Drawing Chiral Molecules	5.3-5.8
15	Racemic MIxtures, Optical Activity, Meso, Molecules with More than One Chiral Center	5.11-5.16
16	Drawing Stereoisomers, Meso Compounds. Alkyl Halides Intro, Classification, and Naming	6.1-6.7
17	The Sn2 Substitution Reaction.	6.8-6.12
18	The Sn1 Substitution Reaction.	6.13-6.16
19	SN1 REactions in More Depth. Elimination Reactions	6.17-6.21
20	E1 and E2 Reactions in More Depth; Recognizing Which Reaction Will Occur. Catchup, Practice.	Catchup
21	Catchup/Practice. First ??? minutes of video 21.	
	Additional Practice Sets/Videos: Br2/hv Products/Mechanisms Practice; Introductory Mechanism Practice; Extra Stereochemistry Practice; Extra Mechanisms + Product Prediction Practice	
	Test 2 Practice Tests: V1, V2, V3, V4	
	TEST 3 LECTURES	
21	Intro to alkenes, Elements of Unsaturation (EU), Last ??? minutes of video 21	7.1-7.6
22	Hydrogenation + Isomers; Alkene Nomenclature. E/Z; Heats of Hydrogenation	7.7-7.10
23	Alkene Synthesis. From RX. Bulky Bases. From Alcohols via Acid-Catalyzed E1. Mechanism Recognition.	7.10-8.2
24	Addition reactions to Alkenes. Addition of HBr; Acid-Catalyzed HOH Addn.	8.1-8.5
25	Acid-Catalyzed HOH Addn; Indirect HOH Addn (Hydroboration-Oxidation). Synthesis Design	8.5-8.7,8-10
26	anti-Mark HBr and HOH addition; Synthesis Design, H2 addn; Br2 addn	8.8-8.9
27	Br2 and BrOH additions and mechanisms; epoxidation	8.12-8.16
28	Epoxidation, Dihydroxylation, Ozonolysis. Stereospecific Alkene Reactions. Synthetic Design.	Catchup
29	Alkene and Diene Addition Polymers. Catchup/Practice.	
	Additional Practice Sets/Videos: Test 3 Extra Practice 1; Test 3 Extra Mechanisms Practice; Test 3 Alkene Reactions Practice; Test 3 Extra Synthesis Practice (6 pages)	
	Test 3 Practice Tests: V1, V2, V3, V4	
	TEST 4 LECTURES	
29	Conjugation, Molecular Orbitals, Dienes, Allylic Cations, Additions to Dienes. Last ??? minutes of video.	15.1-6
30	More allylic cations/radicals/conjugation and Applications;	15.7-11
31	Diels-Alder Reaction; Aromaticity	15.11, 16.1-2
32	Aromaticity; Huckel's Rule and Complex Aromatics	16.1-7
33	Complex Aromaticity, Application, Nomenclature (Skip "endo rule" section in 15.11A, p. 684; Skip 15.12,13)	16.8-11, 13
34	Electrophilic Aromatic Substitution: Intro, Mech, Kinetic Effects	17.1,6-8
35	Reactions in Detail: Halogenation, Nitration, Sulfonation, Alkylation, Acylation	17.2-5,10,11
36	Catchup; Addition to Disubstituted Benzenes; Synthetic Applications	17.9, practice
37	Side Chain Reactions; Retrosynthesis; Synthetic Applications; Practice	17.14
38	Review for Test 4	---
39	More allylic cations/radicals/conjugation and Applications;	15.7-11
	Additional Practice Sets/Videos: HBr Addn to Dienes + NBS Allylic Bromination; Conjugation-Allylic-Diels-Alder Practice; Aromatic Substitution Mechanisms (Products Provided); Aromatic Substitution Product Prediction/Mechanisms/Synthesis Design	
	Test 4 Practice Tests: V1, V2, V3, V4	
	There is NO Cumulative Final Exam for the Summer Course.	

Testing: Either Live at MSUM or PROCTORED for distance students. Testing will NOT be online.

1. **Testing** is one aspect of this "online" class that **cannot be done online.** The nature of organic chemistry requires drawing/illustrating complex structures for chemicals and electron movements during reaction mechanisms. As such it is not conducive to multiple-choice or short-answer questions that are conveniently viewed and answered online. Further, the flexible "asynchronous" scheduling means that some students will take a test before some others; hand-written tests that are proctored and collected upon completion are good for test security.

2. **Flexible Test Scheduling:** There are **not** fixed tests dates. To some degree, you can make arrangements to take the tests (within limits) at your own schedule.
    - You could individualize your schedule. Gone for a long weekend for a family vacation or a wedding or national guard? Having surgery and missing a week? You could work ahead as needed to ensure the ability to master all of the material.

3. **Three Testing options**
    a. **Testing at MSUM**: **Monday, Wednesday or Friday at 11:30 am, Hagen 405/407J**.
        - With the flexible, asynchronous test scheduling, different students will be ready for tests at different times. The next available Monday, Wednesday or Friday will always be an opportunity. (Exception: 4th of July week, I'll be gone on Wednesday/Friday.)
        - I will use a nice conference room (Hagen 405) by my office (Hagen 407J).

    b. **Special Arrangement Testing at MSUM** at times other than M/W/F 11:30am. Depending on my schedule and availability, feel free to at least ask if you could take a test at a time that works better for you. I will probably say yes! Most M-F between 10:30-5 can work.

    c. **Proctored Testing**, local to you: You would make the arrangements. Arrange to have your tests proctored, **typically at a local college, library, church or high school**.
        1) Most colleges have proctoring services.
        2) Many public libraries are willing to provide proctoring services
        3) For taking proctored tests, **YOU** will need to find/arrange the proctor; arrange scheduling with that proctor; email me the name, job, email, and phone number for your proctor; and email me a website for the organization that the proctor is a part of. (For example, if your church pastor is going to proctor your exam, I'd like to look him up to make sure he and the church really exist, before calling him to confirm! ☺)
        4) For proctored tests, I will normally email a copy of the test to the proctor who will print the test. After the test is done the proctor will scan and email me the answers and destroy the printed copy.
        5) Because it takes some time to communicate with the proctor, to load and send copies of tests, and for the proctor to print them, it helps to have some advance notice. (Maybe if you email me on Friday night that you've got a proctored test set up for Saturday afternoon I'll get it sent and it will be printed and ready for you; but don't totally count on it! ☺)

4. **Testing time is 90 minutes**.
        1) Tests are structured so that a well-prepared student should be able to complete a test in 50 minutes or less. But by allowing 90 minutes, that gives extra time to work on problems that you might get stuck on; it provides time to check your work; it provides more space for students who don't work fast; and it provides enough cushion so that you can just focus on your test without being distracted by worrying about the clock.
        2) If you do take proctored tests, you will want to arrange for a 90-minute time block.

5. **PROCTORED TESTS WILL NOT BE RETURNED**. Given the flexible test-scheduling, I will not be able to send you copies of your graded tests. Local students can see graded test in my office. This is one aspect of online organic that can't mirror regular class. But no practical way I can get around it. Sorry. ☹

How can I get off to a good start? Go through the following steps.

1. **Explore the website(s)**: http://web.mnstate.edu/jasperse/Online/chem350online-Summer.htm
   - Find the links for each of the following, and in each case open and browse a little bit:
     a. Lecture Videos:
     b. Practice Tests:
     c. Syllabus:
     d. Textbook and Materials:
     e. Class Notes:
     f. Quizzes:
     g. Online Homework ("Sapling"):
     h. Test 1 (and 2 and 3 and 4) materials:
     i. General Information about how this online organic chemistry course will work
   - **Links for all of the above, and more, are available on the main website**

2. **Before the class begins**, you'll want to have done the following:
   a. Register for the class
      - For distance students or NDSU students (basically students who aren't already MSUM students): http://web.mnstate.edu/jasperse/Online/RegistrationDistanceStudents.pdf
      - Jasperse video explaining:
        - http://coursecast.mnstate.edu/Panopto/Pages/Viewer.aspx?id=c63b561e-e94d-41a0-ba03-2665f23b4f5c
      - For NDSU students: tricollege registration will NOT work for summer. (It could for Organic II during the fall, or Organic I during the spring).
   b. Order books (used textbook and solutions manual).
      - Amazon links: http://web.mnstate.edu/jasperse/Required%20Text%20and%20Materials.pdf
   c. Sign up for Sapling Online Homework: http://www2.saplinglearning.com
      - Process: http://web.mnstate.edu/jasperse/Online/Sapling.pdf
   d. Print Syllabus: http://web.mnstate.edu/jasperse/Online/Syllabus350online-Summer.pdf
   e. Print Class Notes (double-side print, but best to do full-size):
      - http://web.mnstate.edu/jasperse/Chem350/Classbook%20350/Classbook%20Chem350.pdf
      - Buy a big 3-ring binder, and 3-hole punch notes so you can keep them all organized.
   f. Bookmark the following websites:
      - Lecture Videos + Homework: http://web.mnstate.edu/jasperse/Online/Lectures350online.html
      - Main website: http://web.mnstate.edu/jasperse/Online/chem350online-Summer.htm
   g. View the video in which I talk through the syllabus and the course.
      - Access from Lecture Video site: http://web.mnstate.edu/jasperse/Online/Lectures350online.html
      - Maybe set the play speed at x1.25 or x1.5 or x2 for much of it, and/or fast forward through parts that are redundant due to having already reviewed the syllabus and other aspects of the course!
   h. View Jasperse personal introduction video (with face showing! ☺):
      - http://coursecast.mnstate.edu/Panopto/Pages/Viewer.aspx?id=e689da5c-9035-4226-9498-42193086188e

3. **Preparing for Test 1**
   a. Print To-Do Checklist for Test 1: http://web.mnstate.edu/jasperse/Online/Checklist-350Test1.pdf
   b. Review Skills/Competencies for Test 1: http://web.mnstate.edu/jasperse/Online/Objectives350-Test1.pdf
   c. Go through the lectures with the printed notes
      - http://web.mnstate.edu/jasperse/Online/Lectures350online.html
      - After each lecture, review the material
   d. Do lots of Practice/Homework Problems
      - Many sample practice problems integrated into the lectures
      - Required Sapling online homework
      - Practice sets. (Both main website and lectures website link to same sets.)

- Recommended book homework problems as time permits

e. Do the required quizzes (there are two for Test 1)

f. Do the practice tests

g. Arrange proctored testing unless you can test at MSUM.

4. Basics of how the course will work:
   - The course will help you master the content through the use of recorded video lectures and detailed notes; through lots of different practice problems in varying formats; and through multiple practice tests that are similar to the real tests.
   - You will have scheduling flexibility in how fast you move and when you schedule your tests.
   - Tests can be taken via a proctor or at MSUM.
   - The grade will be 80-85% based on test performance, the rest on required homework and quizzes.

Dates, Flexible Schedules: Go-At-Your-Own-Pace "Asynchronous".

1. FLEXIBILITY. You can schedule your own test dates (so long as you finish all by July 27, 2018)

2. The "Official" semester start date is either May 16 (full-term section) or June 5 (8-week section), 2018
   - You can start earlier, much earlier, if you want

3. Semester Completion date: July 27, 2018.
   a. You can finish early, and you can start early (or late), but you MUST FINISH BY JULY 27
   b. MSUM academic calendar: https://www.mnstate.edu/academiccalendars.aspx

4. YOU CAN START EARLY, AND/OR FINISH EARLY. (But must finish by July 27 deadline.)
   - I will try to have all course materials ready/online at least a month (usually many months) early
   - Since lectures and learning materials are online, you don't need to wait for the official university semester start dates to actually start. You could start sooner.
   - ****IF**** you want to complete both Organic I and also Organic II this summer, **starting early will help a lot**!

5. "GO AT YOUR OWN PACE"/ASYNCHRONOUS. Self-schedule your tests.
   - As long as you complete all of the tests by the end of the semester (July 27), test dates are otherwise unfixed/undefined. Some suggested planning schedules are shown on the following pages.
   - Online Homework assignments likewise have no fixed due dates, other than end-of-semester
   - For distance students testing with proctor, you can pretty much set up testing times with your proctor for whatever time fits your mutual schedules.
   - For those testing on-campus, you can schedule to take any test on any Monday,Wednesday or Friday that fits your schedule and your readiness. I will offer regular Monday/Wednesday/Friday testing at 11:30am. Most other days of the week I can also schedule by arrangement between 10:30am-5pm.
   - You can adjust on the fly, to some degree. For example, suppose you were planning to take Test 1 on Friday , June 1, but you realized that if you could study more and take it on Monday June 4, you could do much better. That would be OK. (Of course, it's all too easy to keep "moving tests back" only to run out of time, so be disciplined…)

6. For each individual test, plan to finish the regular lectures a week (or most of a week) prior to when you actually intend to test, so you have time to practice. Practice makes perfect!
   - Organic has LOTS of information. Tests will require that you know how to USE the info.
   - So, doing a lot of practice problems, practice sets, and practice tests is crucial for test preparation.

7. "IT'S EASY TO PROCRASTINATE AND FALL BEHIND. TRY TO SET UP AN AGGRESSIVE SCHEDULE FOR YOURSELF SO THAT YOU GET DONE EARLY. THAT WAY IF YOU DO HAVE SOME SETBACKS, YOU'LL HAVE SOME CUSHION TIME.
   - If you schedule to take the full number of weeks, that will leave you no cushion in case job or other classes or personal issues create a scheduling crisis and leave you unable to prepare adequately.
   - If you schedule to finish early, that provides some "extra" weeks in case you need them. Or, if you finish Organic early, then it won't be competing for limited time late in the semester when you're perhaps cramming to finish papers, projects and final exams in other classes.

8. PROCTORED TESTS WILL NOT BE RETURNED. Given the flexible test-scheduling, I will not be able to send you copies of your graded tests. Sorry. ☹

9. The following pages have some info to help with scheduling.

Some Suggested Possible Schedules: Test Scheduling Possibilities (Overview, see p9,10 for details):

	Using 50-minute MSUM Panopto Videos http://web.mnstate.edu/jasperse/Online/Lectures350online.html	**Alternate Videos** https://www.ndsu.edu/pubweb/~jasperse/Online/onlinelectures-341.htm
Test 1	• Lectures 1-10	• Lectures 1-11
Test 2	• Lectures 10b-21	• Lectures 11-21
Test 3	• Lectures 22-29	• Lectures 22-27
Test 4	• Lectures 30-39	• Lectures 28-34

~11-week: (see next page for more detailed suggested schedule)

- ~Two-and-a-half weeks per test (17 days)
- Days 1-11: Go through all lecture videos, Sapling online homework, and extra practice sets.
- Days 12-16: Study a lot; go through all the practice sets; complete any quizzes or incomplete Sapling; review lecture video discussion on topics that don't make sense; do all the practice tests. Then take the actual test.
- Test 3 doesn't have as many lectures and shouldn't take as long.
- Test 4 is very hard. It takes longer to understand and master the content.

10-week: (see two pages later for more detailed suggested schedule)

- Two-and-a-half weeks per test (17 days)
- Days 1-11: Go through all lecture videos, Sapling online homework, and extra practice sets.
- Days 12-16: Study a lot; go through all the practice sets; complete any quizzes or incomplete Sapling; review lecture video discussion on topics that don't make sense; do all the practice tests. Then take the actual test.
- This is my recommended plan for students just trying to complete Organic 1 (but not Organic 2!
- Why aim for 10-week schedule?
  - Just get it done a week early?
  - Maybe you started late for whatever reason?
  - Provides a little bit of cushion, for cases when you realize you'll need to spend some extra time on a test. (Especially for the last test, which is typically the hardest.)
  - During last summer, I had 160 students who completed course in 8 weeks or less (some in 6 weeks), so it's certainly possible.
- Test 4 is very hard. It takes longer to understand and master the content.

8-week: (see two pages later for more detailed suggested schedule)

- Two weeks per test
- 8 days: Go through all lecture videos, Sapling online homework, and some extra practice sets.
- Days 9-13: Study a lot; go through all the practice sets; complete any quizzes or incomplete or incomplete Sapling; review lecture video discussion on topics that don't make sense; do all the practice tests.
- Day 14: Take the actual test.
- Test 4 is very hard. It takes longer to understand and master the content.

~5-week: (see two pages later for more detailed suggested schedule)

- This is geared **for students who want BOTH Organic I AND Organic II during the same summer**
- ~1 week per test
- On this schedule you might routinely be going through three lecture videos (hour-long) per day, plus reviewing them and doing Sapling homework. You may also need to be using some weekend time, perhaps including Memorial Day weekend time.
- First 4-5 days: Go through all lecture videos, Sapling online homework, and some extra practice sets.
- Days 5-7: Study a lot; go through all the practice sets; complete any quizzes or incomplete or incomplete Sapling; review lecture video discussion on topics that don't make sense; do all the practice tests.
- Day 8: Take the actual test.
- Test 4 is very hard. It takes longer to understand and master the content. So be sure to complete Test 3 on schedule.

Note: If you really want to complete both Organic I and Organic II during the summer, but the pacing required for successful completion by July 27 proves to be too fast, contact Dr. Jasperse to discuss possible workarounds.

Possible/Suggested 10-week Schedule (you can personalize it, and start it earlier or later):

- Geared to be non-rushed, but to get everything done one week before the July 27 deadline, and give some July and August free!
- Note: It's really easy to have a plan but then to fall behind. It is wise to plan complete all the work work a week early. That provides a little bit of cushion, for cases when you realize you'll need to spend some extra time on a test. (Especially for the last test, which is typically the hardest.)
- This is **my favorite, recommended schedule** if you only want to complete Organic I!
- **This should involve about 6 lectures per week.**

	Using 50-minute MSUM Panopto Videos http://web.mnstate.edu/jasperse/Online/Lectures350online.html	**Alternate Videos** https://www.ndsu.edu/pubweb/~jasperse/Online/onlinelectures-341.htm
Test 1 Friday June 1	• Lectures 1-10a • Finish lectures/Sapling by/before Monday, May 28 • Digest/Practice/Integrate Tues-Thurs	Lectures 1-11
Test 2 Wednesday June 20	• Lectures 10a-22a • Finish lectures/Sapling by/before Friday, June 15 • Digest/Practice/Integrate weekend/week	Lectures 11-21
Test 3 Friday July 6	• Lectures 22-29b • Finish lectures/Sapling by Monday, July 2 • Digest/Practice/Integrate week/weekend	Lectures 22-27
Test 4 Friday July 20	• Lectures 30-38 • Finish viewing lectures by Friday, July 13 • Digest/Practice/Integrate rest of week	Lectures 28-34

Suggested ~11-week Schedule: For students in the Full-term May 16-July 27 Section who want to complete Organic I (but not also Organic II during the same summer)

- Note: It's really easy to have a plan but then to fall behind. It is wise to plan complete work a week early (see the 10-week plan above). That provides a little bit of cushion, for cases when you realize you'll need to spend some extra time on a test. (Especially for the last test, which is typically the hardest.)

	Using 50-minute MSUM Panopto Videos http://web.mnstate.edu/jasperse/Online/Lectures350online.html	**Alternate Videos** https://www.ndsu.edu/pubweb/~jasperse/Online/onlinelectures-341.htm
Test 1 Monday June 4	• Lectures 1-10a • Finish lectures/Sapling by/before Tues, May 29 • Digest/Practice/Integrate rest of week/weekend	Lectures 1-11
Test 2 Thursday June 21	• Lectures 10a-22a • Finish lectures/Sapling by/before Fri, June, June 17 • Digest/Practice/Integrate weekend/week	Lectures 11-21
Test 3 Monday July 9	• Lectures 22-29b • Finish lectures/Sapling by Wed, July 4 • Digest/Practice/Integrate week/weekend	Lectures 22-27
Test 4 Friday July 27	• Lectures 30-38 • Finish viewing lectures by Friday, July 20 • Digest/Practice/Integrate rest of week	Lectures 28-34

Notes on the 11-week schedule:

- On this schedule you might routinely be going through one lecture video (hour-long) per day, plus reviewing them and doing Sapling homework. Complete those far-enough in advance of test days so as to give yourself time to put everything together in advance of a test.
- The lecture videos will be available by Feb 14. So you could start early if you wished.
- **The actual official end-of-semester drop-dead completion deadline is Friday July 27, 2018**.

Suggested 8-week Schedule: For students in the 8-week June 5-July27 Section

- Geared towards students who are taking just CHEM341-online, starting June 5
- Note: It's really easy to have a plan but then to fall behind.
- I estimate an average of 20 hours-per-week is an appropriate time allocation for a student whose chemistry aptitude is good.

	Using 50-minute MSUM Panopto Videos http://web.mnstate.edu/jasperse/Online/Lectures350online.html	**Alternate Videos** https://www.ndsu.edu/pubweb/~jasperse/Online/onlinelectures-341.htm
Test 1 Monday June 18	• Lectures 1-10a • Finish lectures/Sapling by/before Thursday, June 14 • Digest/Practice/Integrate Friday+Weekend	Lectures 1-11
Test 2 Monday July 2	• Lectures 10a-22a • Finish lectures/Sapling by/before Thursday, June 28 • Digest/Practice/Integrate Friday+Weekend	Lectures 11-21
Test 3 Thursday July 12	• Lectures 22-29b • Finish lectures/Sapling by Sunday, July 8 • Digest/Practice/Integrate Mon-Wed	Lectures 22-27
Test 4 Friday July 27	• Lectures 30-38 • Finish viewing lectures by Monday, July 23 • Digest/Practice/Integrate Mon-Thurs	Lectures 28-34

Notes on the 8-week schedule:

- On this schedule you might routinely be going through 6-7 lecture videos (hour-long) per week, plus reviewing them and doing Sapling homework. Then you'd have several days to study for tests.
- The lecture videos will be available by Feb 14. So you could start early if you wished.

Suggested 5-week Schedule May 16-June 20**:**

- **For students who want BOTH Organic I AND Organic II during the same summer.**
- Basic time frame for this suggestion: May 16-June 20 (~5 weeks) for Organic I, then June 21-July 27 (~5 weeks) or Organic II.
- **Starting sooner would sure help!**
- Can also be used in conjunction with CHEM360-Face-to-Face-Section, June 21-July 27
- If you drag beyond 5 weeks for Organic I, it will only leave you less time for Organic II! ☺
- Note: Completing both courses in <11 weeks requires a very serious commitment and a lot of time. I estimate an average of ~32 hours-per-week is an appropriate time allocation.
    - In other words, completing both Organic I and Organic II while also working fulltime at a job is not going to work! ☺

	Using 50-minute MSUM Panopto Videos http://web.mnstate.edu/jasperse/Online/Lectures350online.html	**Alternate Videos** https://www.ndsu.edu/pubweb/~jasperse/Online/onlinelectures-341.htm
Test 1 Thursday May 24	• Lectures 1-10a • Finish lectures/Sapling by/before Monday, May 21 • Digest/Practice/Integrate Tues+Wed	Lectures 1-11
Test 2 Monday June 4	• Lectures 10a-22a • Finish lectures/Sapling by Thursday, May 31 • Digest/Practice/Integrate Fri+Sat+Sun	Lectures 11-21
Test 3 Monday June 11	• Lectures 22-29b • Finish lectures/Sapling by Thursday, June 7 • Digest/Practice/Integrate Fri+Sat+Sun	Lectures 22-27
Test 4 Wednesday June 20	• Lectures 30-38 • Finish viewing lectures by Friday, June 15 • Digest/Practice/Integrate Sat+Sun+Mon+Tues (hard one)	Lectures 28-34

Notes on the 5-week schedule:

- On this schedule you might routinely be going through three lecture videos (hour-long) per day, plus reviewing them and doing Sapling homework. You may also need to be using some weekend time.
- The lecture videos will be available as of Feb 14. So you could start early if you wished.
- Starting early, by Monday May 14, or preferably week(s) before that, would relieve some pressure.

On-Line Lectures: http://web.mnstate.edu/jasperse/Online/Lectures350online.html

1. These are normally recorded "Panopto" lectures from previous semester's face-to-face class. You will see and hear exactly what a student would see in a regular face-to-face class.
2. Analogous 60-minute "Tegrity" lectures. (These were recorded during an Organic Chemistry I class I taught at North Dakota State University. If the Panopto server is down, the content is the same.)
   - https://www.ndsu.edu/pubweb/~jasperse/Online/onlinelectures-341.htm
3. Because the video lectures were actually recorded previously, they often mention Sapling due dates, test days, or days of the week that won't make any sense to you. Beware of those!
4. While there are additional study materials and videos, the main lecture videos are normally 50-minutes in length.
5. There are 39 such lectures.
6. "Watching" videos is one thing; understanding everything enough to do everything is quite another! Getting a good grade in organic chemistry is definitely not a spectator sport!
7. **Normally you'll have wanted to work through all the lectures up to a week before taking a test, so that you've got time to practice, review, integrate, and synthesize all the information, and so that you've got time to work through the practice sets and practice tests, etc**..
8. **Panopto podcasts can be easily downloaded to your computer so that you can view without streaming.**
   - If you don't have consistent fast internet, you may wish to download a whole bunch of videos while you do have access to fast internet. Then if you're on an airplane, or on the bus for an athletics trip, or visiting grandparents, you'll still be able to view the videos! ☺
   - **Usually if you right-click on the link to a Panopto podcast, you'll get a menu that includes a chance to save/download the video.**
   - For Pantopo videos, I usually list both the streaming and the podcast versions. I've already converted the podcasts into mp4 format, which streamlines the download process.
9. There are several display options, including full screen.
10. There are also play-speed options. If I'm lecturing too slowly, you can speed it up and get through faster? Often enhanced speed is helpful for trying to find something in a video. Or you can slow me down if I'm talking too fast.
11. The ability to pause and rewind is really helpful for difficult topics.
12. If the Panopto server is ever down, you could usually view comparable Tegrity videos:
    - https://www.ndsu.edu/pubweb/~jasperse/Online/onlinelectures-341.htm

Do you have the Technical Capacity to play the online videos effectively? And Downloading so you don't need to have streaming internet.

- Note: Most videos were created using either "Panopto" or "Tegrity". You will want your computer able to play videos of both types.

1. Tegrity Diagnostic: http://ndsu.tegrity.com/TegrityUtils/Diagnostic.aspx
2. Panopto Test (no "diagnostics" page, but should load and play if everything is fine):
   - Podcast Panopto: http://coursecast.mnstate.edu/Panopto/Content/Sessions/bad2da5d-3bab-45b9-8ed0-4bfa6a83afdf/4c75611e-583d-4186-8ee2-b0d2ee7613a0-3c28dc83-5922-4d1b-baca-b4c1f16d9b02.mp4
   - Streaming Panopto: http://coursecast.mnstate.edu/Panopto/Pages/Viewer.aspx?id=ee9b1109-7b18-4caa-8065-38ab25c74561
   - Note: if your internet speed was fine for Tegrity, it will also be fine for Panopto
3. For additional syllabus information regarding technical capacity expectations and technical support, see **Technical Skills** and **Technical Support** sections later in syllabus. (Page 18?)

Which Videos go with Which Tests? And why you need to finish the Videos Well before taking the test:

- You need to get through all the lectures but then also have time to put everything together.
  - If you're doing the last lecture the night before taking a test, you'll not succeed on tests!
  - You need time to put it all together: review and study everything; practice everything; finish your required Sapling homework; do more book practice; and do the practice tests!
- **You'll want to have finished going through all the lectures most of a week before taking a test so you've got time to actually master everything and become test-success ready.**
- **Many additional practice sets and videos are linked from the lectures web page**

	Using 50-minute MSUM Panopto Videos http://web.mnstate.edu/jasperse/Chem350/chem350lectures-2014.htm	**If you use 60-minute NDSU Tegrity Videos** http://www.ndsu.edu/pubweb/~jasperse/Chem341/chem341-onlinelectures-2015.htm
Test 1	• Lectures 1-10	• Lectures 1-10
Test 2	• Lectures 10b-21?	• Lectures 10-16
Test 3	• Lectures 21-29(?)	• Lectures 17-26
Test 4	• Lectures 29-39	• Lectures 27-34

In-Class Notes: http://web.mnstate.edu/jasperse/Chem350/Classbook%20350/Classbook%20Chem350.pdf
I have a very thorough set of notes that can be used in class. Included will be numerous examples and practice problems that I/we will work in lecture together. You should print the notes (print on both sides of a page), 3-hold punch them, and keep them organized in a 3-ring binder. Many students actually print two copies, one to work through with me during lecture, the other set for working out on their own after lecture.

Practice tests, Answers, and Videos:
http://web.mnstate.edu/jasperse/Chem350/Practice%20Tests/Chem350PracticeTests.html

1. There are four practice tests available for each test which can be printed from the website.
2. These are normally exact copies or slightly edited versions of actual past tests. As such they are invaluable for getting an idea of what my tests look like, for evaluating whether you are or aren't well prepared, and for recognizing study areas that need additional attention.
3. For each test, there is also an answer key, and a video in which I discuss each problem.
4. For each test, there is also a "test preview" in which I discuss the format, length, and distribution.

Extra Practice Problems and Practice Sets: http://web.mnstate.edu/jasperse/Online/chem350online.htm
Between Sapling homework, assigned/recommended book problems, and practice tests, there are usually a good variety and volume of problems to assess your understanding and to practice and sharpen your skills.

1. However, for each test I have also created a series of additional practice sets to address important learning skills. Sometimes these are topics where I know students tend to struggle, or where the Sapling/book problems aren't perhaps as representative of test problems as I'd like.
2. For each of these extra practice sets, you can print them from the website; there are answers provided; and in each case I have a video created to talk through each problem.
3. Having the video explanation/discussion is helpful for many students in trying to understand the process for solving problems. Obviously the book problems and Sapling problems don't have the same kind of commentary available.

Sapling On-Line Homework: http://saplinglearning.com
More details on a later page. Sapling's modules enable one to interact with 3D models and draw chemical structures. You get instant grading, sometimes response-specific coaching, and detailed answer explanations. The Sapling homework also provides an effort-driven opportunity to earn some points! (Sapling averages are typically much higher than test averages.)

Sapling OnLine Homework, version 2018

- Sapling should be ready at least by Dec. 13, and can be sooner by arrangement.

Getting on when you've already enrolled: (see lower down for enrolling at first)

1. Website: http://www.saplinglearning.com/
2. Login
3. Click on your class
4. If you click on "Activites and Due Dates" in the upper left corner, that will list assignments.
5. Miscellaneous:
   - After you open an assignment, there is an option to "print" it. I like to write on paper and keep my work so I can study it later, for example. However, this will NOT print the "hints" which are often very helpful.
   - You can try a problem as many times as you like. But the scoring will cost you 5% of the points available (per problem) for each incorrect attempt.
   - **Jasperse can enter due-date extensions.**
   - Take some time with the introduction materials, including the "training assignment" and the "drawing tips and shortcuts" practice problems.
   - You can go back and work on things after they are due. So you can use these as a study tool later on if you wish (or when you're studying for PCAT or whatever….)

Re-enrolling for Organic II, if you Paid a 2-semester package fee for Organic I

To register for the course for those who purchased the two semester access, find the course. From there, if you paid the 2-semester access, there should be a button that says "Use your Sapling Learning Credit to enter the course" (provided you haven't used the credit on any other courses). Click the button and you should have access.

Enrolling at the beginning

1. Go to http://saplinglearning.com
2. a. If you already have a Sapling Learning account, log in, click "View Available Courses", then skip to step 3. b. If you have a Facebook account, you can use it to quickly create a SaplingLearning account. Click "create account" located under the username box, then click "Login with Facebook". The form will auto-fill with information from your Facebook account (you may need to log into Facebook in the popup window first). Choose a password and timezone, accept the site policy agreement, and click "Create my new account". You can then skip to step 3. c. Otherwise, click "create account" located under the username box. Supply the requested information and click "Create my new account". Check your email (and spam filter) for a message from Sapling Learning and click on the link provided in that email.
3. Find your course in the list (listed by school, course, and instructor) and click the link.
4. Select your payment options and follow the remaining instructions. NOTE: Sapling Learning costs $40.00 for a single semester or $60.00 for two semesters. You will be prompted before payment and asked if you would like to purchase two semesters for a discount. You will need to purchase two semesters in advanced to receive the multi-course discount. There is a 14 day grace period to access your courses before payment, and there is a 60 day refund policy. For more information on refunds, visit: http://www.saplinglearning.com/help/?topic=9

- Once you have registered and enrolled, you can log in at any time to complete or review your homework assignments.
- During sign up - and throughout the term - if you have any technical problems or grading issues, send an email to support@saplinglearning.com explaining the issue. The Sapling support team is almost always more able (and faster) to resolve issues than your instructor and TAs.

****

Study Strategy: Putting off the extensive information in organic chemistry will only make it harder on you. After each lecture, try to study the day's notes and work all of the assigned book problems. Some practical study thoughts:

1. General university policy is that an average student in an average class should study for at least two hours out of class for one hours in class to get an average grade.
   - Fact: Organic chemistry isn't really an average class! And do you want an average grade?
2. I suggest reviewing the class notes and in-lecture practice problems ASAP after a lecture, and going through the material at least twice.
3. Many students print an extra copy of class notes, and try to redo all the in-lecture problems on their own.
4. I suggest working Sapling/book problems associated with the sections covered in class right after that.
5. Reading the book: the textbook is a support resource. If you didn't understand some of the material in class, the book will frequently have a more complete and detailed discussion that will help you understand things.
6. If I decide I'm not going to take the time to study the class notes, to do Sapling and book problems, and to read the book, which one should I sacrifice first? Possibly some book reading? If you read but run out of time before you get to practice and understand the problems, it's not a recipe for success.
7. The practice tests are excellent rehearsal for the real tests.
   - http://web.mnstate.edu/jasperse/Chem350/Practice%20Tests/Chem350PracticeTests.html
8. Some recorded lectures from the Spring class may be rushed or not super clear. Alternative lectures covering analogous notes are available from this past summer:
   - **http://www.ndsu.edu/pubweb/~jasperse/Chem341/chem341-onlinelectures-2015.htm**

"ChemSurvival" Videos by Professor Ron Davis: lots of nice videos!

- Full ChemSurvial site: https://www.youtube.com/user/ChemSurvival/videos?flow=grid&view=0
- Relevent ones are often linked from my lectures website.
- Professor Davis's ChemSurvival videos are frequently of very high quality, with excellent molecular-model displays. In many cases where I'd be displaying molecular models while teaching a face-to-face class, the ChemSurvival videos will do a comparable (or usually better) job of enabling visualization.
- Professor Davis is an excellent teacher and communicator, so there may be times when perhaps things just make better sense with some of his videos and explanation than they do in the regular lecture! If so, please take advantage of whatever enables you to learn and master the material!

MSUM e-mail address. You can have MSUM emails forwarded to a different address, if you get appropriate IT help.

- Assuming you don't otherwise look at your MSUM email address, send me the actual email address that you use so my class emails actually get to you.

Class E-Mail List: An email list will be sent to all registered students before the class officially begins.

- **The list may use your MSUM address, so if you haven't received an email from me, send me an email with the address you'd like me to use!**

Book Homework Problems: (see list on following page).

- All assigned/recommended book problems represent what I consider to be reasonable test-level problems. I have gone through each problem in the book and selected out those I think are the most representative and practical.
- There may be a few that are trickier than I'd put on a real test, but the majority are ones you ought to be able to do.
- 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 "quiz" assignment problems that I require and grade are no substitute for doing book homework problems! Likewise the on-line Sapling homework will not be sufficient**.

ORGANIC CHEMISTRY I PROBLEMS
Based on Organic Chemistry (8th Edition) by L. G. Wade Jr

Note: if you have the 7th or 6th edition of Wade, or if you have a Carey textbook as used at NDSU, lists of problems are linked from my website, or you can email me to get the list.) Contact me if that's your situation, or see the following link:

- http://web.mnstate.edu/jasperse/Chem350/Other-Textbooks.html

Amazon link, for Used Textbooks and Solutions Manuals (Cheap)

- Organic Chemistry (8th Edition) by L. G. Wade Jr

https://www.amazon.com/s/ref=nb_sb_ss_i_3_18?url=search-alias%3Dstripbooks&field-keywords=wade+organic+chemistry+8th+edition&sprefix=Wade+Organic+Chemi%2Cstripbooks%2C167&crid=EQRKPH7VPDSN

Chapter Topic	Wade Chap	Wade 8 Problems In the Chapter	Wade 8 Problems Back of the Chapter
Intro and Review	**1**	2a-f, 3a-h, 4, 5a-c, 6(omit boron ones), 7a,b,d,e,g, 8a,e,f,g,h, 9, 10, 11, 15, 17a, 18a,c,e,f, 19.1,2a-f [determine which is the "nucleophile" (electron pair donor) and which is the "electrophile" (electron pair receiver).]	23, 25-29, 31, 34, 35.1, 36, 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), 45 (use nucleophile/electrophile designation, and definitely practice the arrow pushing), 46, 47a,b,d
Structure and Properties	**2**	1b (draw), 3, 4, 5, 8, 9, 10 (three do, three don't), 11, 16 (structures are on previous page), 17 (omit a), 18-20, 21 (skip d), 22 [Note: for functional group problems, skip the "cyclic" designation!]	23, 26, 27, 33-35, 38-40, 41 (skip c), 42, 44
Alkanes	**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, 49
Chemical Reactions.	**4**	1a-c, 2, 4a, 9a, 11-13, 18, 19a-d, 24, 25, 28-32.	34-39, 41-44, 46a,b,e
Stereo chemistry	**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	25, 26a,c,d,j-p , 27, 30d, f-h 31a, f-i, 36
Alkyl Halides: SN2, SN1, E2, E1 Reactions	**6**	1, 2c,e,f, 3.1,3, 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), S_N1 Reactions: 22, 23, 24, 25, 27, 29 (very interesting. Probably not test fodder.) Elimination reactions: 30, 31, 32, 33b-d, 34-39, 40	41, 42a,c-e, 43a,b,e,f, 44**, 45("solvolysis" is substitution by solvent, and is always S_N1), 46, 48-53, 56, 59-61
Alkenes	**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, h, 6a,d,e, 7a,e, 8a,c,e, 10b-d (more stable only. Skip the part about how much difference in energy), 12a,c, 13, 16, 17, 18, 19, 24, 25, 27, 28b,c (c first one), 29a,b (ignore 3rd product.)	30, 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
Alkene Addition Reactions	**8**	1-4, 6, 8-11, 13-20, 21a-d, 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-f, 35 (d,l means racemic mix of chiral products), 36, 37	46 (good synthesis design practice), 47 (,skip o; good practice for "predict the product" reactions.), 48a, b, c,e,f 49a,b,c,d,e,f,h, 50a-l, 59, 61
Conjugated Systems	**15**	1, 2, 4, 5, 6, 7(skip c), 9, 10-11(NBS=Br_2/hv), 12, 14, 15 (skip d), 16 (ignore stereochem), 18	24, 25a-d,g-i, 27, 30, 31, 33a-f
Aromatics	**16**	3(skip cyclooctatetraene), 5, 7b-d, 8, 12, 15, 16 (pyrrole picture on top of page, Fig 16.12), 17 (purine picture in section 16-9c), 19, 24a, c,e,g	26a-f, 27a-c,e,f, 28, 32, 34 (hint: N lone pairs are strongly basic when sp^3 or sp^2 but weakly basic when p), 35, 36, 37 ("xylene" means dimethyl benzene), 43
Aromatic Reactions	**17**	2, 3(p-xylene is 1,4-dimethylbenzene), 5, 6, 7, 8, 11, 12, 13, 14b(i-iv), 15a,c, 18, 19a, 20a-c	44a,b,d,f,h,j,l, 46a,b,e,f,g, 47b-f,h,i,j,l, 48, 51, 57

Getting Help, Office Hours, Course Communications:

1. Live Face-to-face office hours:
   - M-H 11:00-2:00
   - MSUM office: Hagen 407J. Phone 218.477.2230

2. Instructor Help Options
   a. Phone! Often works very well.
   b. Email: I check often, including nights and Saturdays
      - Many students use screen shots, whether for a Sapling homework question, or something in the notes or a practice test or something. This makes it easy to show what you're having trouble with, and makes it easy for me to focus my answer.
   c. Sapling: I can actually look at wrong answers that you've submitted, and sometimes screen-shot and email-explain why they're wrong and what you should have done instead
   d. Explain Everything/YouTube video answers:
      - I may explore creating draw-and-talk video recording response to some student questions, and then sending you the YouTube link to view that explanation. Not sure how effective this will be, or how time-consuming each will be for me to record. So no promises here! ☺
   e. Online virtual office hours: Use of Webex may be possible.

Classroom Response Plan

1. Quizzes or tests will normally be graded with scores posted by end of the next Tuesday or Friday.
2. Emails will *normally* be answered within 48 hours on M-F ("work days"). I will try and will often respond variably faster than 24 hours.
3. Emails coming in after 10pm will rarely be answered until the following day.
4. I often process class emails on Saturdays as well as M-F, but not on Sundays.
5. If you include a screen shot of the problem or question you have in mind, response will be faster! :)
6. Information about proposed proctor should be sent to me at least 3 workdays prior to the first test with that proctor to ensure that the test(s) can be sent in time.

American Chemical Society certified: Minnesota State University Moorhead's chemistry department is certified by the American Chemical Society

- May be helpful information for national students from non-MSUM schools.
- If your advisor or records office wonders if Organic Chemistry at MSUM is legit, they might ask if it's ACS- accredited.

Academic Honesty

The University expects all students to represent themselves in an honest fashion. When an instructor has convincing evidence of cheating or plagiarism, a failing grade may be assigned for the course in which the student cheated. Instructors also may choose to report the offense. A student who has a course grade reduced by an instructor because of cheating or plagiarism, and who disputes the instructor's finding, may appeal the grade, but only by using the Grade Appeal Policy. For a full description of the MSUM Code of Academic Honesty, see: http://www.mnstate.edu/student-handbook/policies-procedures.aspx

University Policies: As a student of MSUM, you are expected to be familiar with all University policies. These can be found in the Polices & Procedures section of the Student Handbook.

- https://www.mnstate.edu/student-handbook/policies-procedures.aspx

For Some Other Questions or Issues About how this Online Organic Chemistry Course will Work, see the following Website:

- http://web.mnstate.edu/jasperse/Online/OnlineOrganicGeneral.htm
- The website addresses some common questions students have asked me about the course.
- I usually provide some notes, and video in which I talk through some thoughts about each topic.

Getting Registered for MSUM and for the Course, for non-MSUM Students:

- **Note: This includes NDSU students.**

1. **Apply to MSUM as a "Non-degree seeking student"**: https://www.mnstate.edu/admissions/non-degree/apply.aspx
   a. Online: Click the "Apply Online" button (from above link).
      - Create StarID first, and a password. Record these so you can access later! ☺ (You'll need them!)
      - Don't actually need to fill in several pages about HS background etc.
      - Be sure to mark "Complete courses and transfer without a degree" and "Part Time Student" buttons
      - On page where it says "Major-Academic Program", don't enter anything
      - Please do **NOT** click promo code towards the end, if you see something like that.
      - $20 fee at the end; should be box that says "Pay Now"; click on that and be able to submit payment
      - If prompted for immunization (shouldn't be), can self-report: https://www.mnstate.edu/hendrix/immunizations.aspx
   b. Application Option using a short fillable PDF form: (This can be fast, if in rush to beat deadline…)
      https://www.mnstate.edu/uploadedFiles/Orlando/Content/Admissions/Undergraduate/Non-Degree_Seeking_Student/Non-degree-Seeking-Student-Undergraduate-Application.pdf
      - Can email (admissions@mnstate.edu) or snail-mail (address is on 2nd page of PDF form)
      - $20 application fee by check, or debit/credit card (call business office: 218.477.2221)
   c. You will not need to send official transcripts from your school for MSUM application.
   d. Approval usually takes 1-7 days. You will be notified by both email and snail-mail.
   e. Deadlines:
      - Online application should be submitted by May 11 (for full term) or May 31 (for 8-week session)
      - Faster PDF form (see b above) still accepted until May 18 (full term) or June 7 (8-week session).
      - Class registration must be completed by May 22 (full term) or June 11 (8-week session.)
      - If you don't get ≥$300 payment in by start of semester, you'll get dropped from class roster.

2. **Register: Actually register for the course(s):** http://www.mnstate.edu/eservices/
   a. You'll need your StarId and password to login. (There are prompts if you've forgotten.)
   b. Your admission into MSUM will need to have been completed.
   c. Registration for summer classes will open on Tuesday, April 3rd, 2018, at 8am
   d. If prompted for immunization (shouldn't), can self-report: https://www.mnstate.edu/hendrix/immunizations.aspx
   e. Pay First: After registering, pay ≥$300 by start of semester, or you'll get dropped from class roster.
   f. Pay Rest: If you don't complete your payments, your grade will never be released!
   g. Can pay online (https://www.mnstate.edu/eservices/), or use debit/credit card on phone to business office: 218.477.2242
   h. Payment reminders are emailed to your MSUM email, which you may not check? So remember to pay!

3. **Tuition: Varies by State. (Numbers listed are for Spring and Summer, 2018; will inflate for later years…).**
   - ~$928: Minnesota, SD, ND, and WI (reciprocity states). [Note: cheaper than NDSU! ☺]
   - ~$1287 IL, IN, KS, MI, MO, NEB (Midwest Consortium states)
   - ~$1645 Other states

4. **For NDSU or Concordia Students: Does Tricollege work, and if so, how? Not exactly for summer….**
   a. For my summer Organic Chemistry classes, NDSU students will need to apply to MSUM as part-time students, and pay tuition to MSUM for the class. (See procedures in steps 1 and 2 above.)
      - This will save you ~$130 per course! ☺ (NDSU summer courses cost more than at MSUM.)
   b. Tricollege WILL apply in the Fall Semester for Organic II
      - This means that if you pay "full-time-student" tuition to NDSU in fall, you could take my Fall Organic II online class from MSUM without needing to pay any extra tuition.
      - You would need to pay the "course fees" to MSUM, ~$211 as of spring 2018.
   c. Tricollege WILL apply in Spring Semester for Organic I.

Academic and Student Support Services: The Academic Support Center has resources to assist you with Advising, Registration, Academic Support and Tutoring, and Academic Enhancement.

1. Visit their website for a list of Services or call 218.477.4318.
   - http://www.mnstate.edu/asc/
2. Some online Tutoring is available to assist students.
   - http://www.mnstate.edu/asc/onlinetutoring.aspx
3. The Student Handbook is a valuable reference available to you.
   - http://www.mnstate.edu/student-handbook/
4. eServices provides online registration and account management.
   - http://www.mnstate.edu/eservices/
5. Library Distance Ed Services are available to you as you research and study.
   - http://libguides.mnstate.edu/content.php?pid=448709
6. The Disability Resource Center provides services to students with documented disabilities.
   - http://www.mnstate.edu/disability/

Technical Skills: Certain minimum technical skills are expected. I expect you to be able to:

1. Navigate the main course websites and links within:
   - Course homepage: http://web.mnstate.edu/jasperse/Online/chem350online.htm
   - Lectures and Activities Page: http://web.mnstate.edu/jasperse/Online/Lectures350online.html
   - Practice Tests Page: http://web.mnstate.edu/jasperse/Chem350/Practice%20Tests/Chem350PracticeTests.html
   - Quizzes Page: http://web.mnstate.edu/jasperse/Online/Quizzes350Online.html
2. Access and Navigate D2L Brightspace
   - https://mnstate.ims.mnscu.edu/?target=%2fd2l%2fhome
   - In order to enter D2L Brightspace, you'll need to know your Star ID and password
   - This where you will access grades
   - I may add a discussion page, but it does not exist yet.
3. Use and check e-mail regularly. ☺
   - The default email address will be your mnstate.edu address.
   - If you want to use your different, normal address, email me and for class-related emails I can send to your regular address. But, any university-sourced emails will still go your mnstate.edu address.
4. The ability to take screen shots on your device(s) and attach them to emails
   - Often getting good feedback is easiest if you can take a picture of a problem, or something in the notes or in a lecture that you didn't understand, or an online-homework answer that seems wrong or confusing.
   - So the ability to take screen-shot pictures of something on your computer screen and then to email that to me with whatever your related question is helps a lot.
5. The ability to download mp4 video files. (An example of an mp4 podcast is linked below.)
   - http://coursecast.mnstate.edu/Panopto/Content/Sessions/4579d928-3d74-4738-ba31-260672f613a5/d322606c-c296-4c4c-854f-0bd90e2c2939-beb791c3-86ed-4b73-80f0-aa378ee07ae6.mp4
   - For some students who don't always have fast streaming internet, downloading the podcasts to your computer allows viewing without fast internet.

Technical Support

1. MSUM IT Help Desk: phone 218.477.2603; support@mnstate.edu; drop-in Library 122.
   - http://www.mnstate.edu/helpdesk/
   - Student specific: https://www.mnstate.edu/helpdesk/students.aspx
   - Helpfiles for various tasks: https://www.mnstate.edu/helpdesk/helpfiles.aspx
2. D2L Brightspace Tutorials are available for students:
   - https://www.mnstate.edu/instructional-technology/desire2learn/
   - http://www.mnstate.edu/instructional-technology/desire2learn/#tabs-4
3. Sapling: mailto:support@saplinglearning.com
4. Other problems: mailto:jasperse@mnstate.edu

Accessibility

Minnesota State University Moorhead is committed to providing equitable access to learning opportunities for all students and strives to make courses inclusive and accessible in accordance with sections 504 and 508 of the Rehabilitation Act and the Americans with Disabilities Act. The University will make reasonable accommodations for students with documented disabilities. The Disability Resource Center (DRC) is the campus office that collaborates with students in need of special accommodations to assist in providing and/or arranging reasonable accommodations.

If you have, or think you may have, a disability (e.g. mental health, attentional, learning, chronic health, sensory or physical):

- Please contact the DRC at (218) 477-4318 (V) or (800) 627.3529 (MRS/TTY) to schedule an appointment for an intake.
- Online students may need to schedule a phone meeting or web conference.
- If you are already registered with the DRC and have a current Accommodation Letter, please schedule an appointment to visit with me, during my office hours, to discuss implementation of your accommodations.
- Additional information is available on the DRC website: http://www.mnstate.edu/disability/

Technology Privacy Policies and Accessibility Statements

Links to the privacy policies and accessibility statements for third party software used in this course are listed here.

Heavily Used Technologies:

- Dreamweaver
  Accessibility: http://www.adobe.com/accessibility/products/dreamweaver.html
- Panopto
  Accessibility: http://support.panopto.com/documentation/viewing/accessibilityfeatures
- Adobe Acrobat Reader
  Accessibility: http://www.adobe.com/accessibility/compliance/acrobat-xi-standard-section-508-vpat.html
  http://www.adobe.com/accessibility/products/acrobat.html
- Sapling Online HomeworK
  Accessibility: http://www.saplinglearning.com/ibiscms/help.php?file=accessibility.html

Modestly Used Technologies:

- D2L Brightspace
  Privacy: http://www.brightspace.com/legal/privacy/
  Accessibility: http://www.brightspace.com/accessibility/
  http://www.brightspace.com/accessibility/standards/
- Tegrity Accessibility:
  http://createwp.customer.mheducation.com/wordpress-mu/success-academy-student/accessibility/#.VucsW1JBJ8U

Rarely Used Technologies (but may pop up a couple of times or situations.)

- WebEx
  Privacy: http://www.webex.com/terms-of-service.html
  Accessibility: http://www.cisco.com/web/about/responsibility/accessibility/legal_regulatory/vpat s.html - webex
- YouTube Accessibility:
  screen reader: https://support.google.com/youtube/answer/189278?hl=en
  captions: https://support.google.com/youtube/answer/100078?hl=en
- Java Accessibility: http://www.oracle.com/technetwork/articles/javase/downloads-jsp-138220.html
- Miscrosoft Word Accessibility: http://www.microsoft.com/enable/microsoft/section508.aspx
- MS products: https://www.microsoft.com/enable/microsoft/section508.aspx

Course Summary

MSUM Bulletin Course Description: **CHEM 350. Organic Chemistry I. 3 Credits**. Introduction to the classification, structure, reactions, and reaction mechanisms of carbon compounds. Prerequisites: CHEM 210 (General Chemistry II).

Instructor Description: The course is the first semester of a fairly standard two-semester lecture course in organic chemistry. It is designed for science majors, including chemistry and biology majors, and including those preparing for health professions.

Coverage includes nomenclature, structure, properties, and the synthesis, reactions, and reaction mechanisms of alkanes, alkyl halides, alkenes, aromatics, and conjugated systems. Stereochemistry is covered. Reaction types covered include radical halogenation, S_N2 and S_N1 substitutions, E2 and E1 eliminations, addition reactions to simple alkenes and conjugated dienes, Diels-Alder reactions, and aromatic substitution reactions. Reaction mechanisms are emphasized. Synthesis design and retro-synthesis are emphasized. Structure, stability, stability-reactivity principles, acid-base chemistry, nomenclature, resonance, conjugation, and aromaticity among many other topics, are addressed.

ONLINE LAB IS NOT POSSIBLE.

Required work includes tests, online homework, and some "quizzes". Multiple self-assessment tools are available (sample problems in lecture; online homework problems; textbook problems; extra practice sets; and practice tests.) While this is an online course, it is similar to a traditional course in that videos of actual face-to-face lectures are used (with the advantage of pause-and-rewind). Answers and video explanation of all problems on the practice sets and practice tests are provided. Tests are NOT taken online; hand-written on-paper tests must be taken either at MSUM or using a proctor. The course is go-at-your-own-pace; there are not fixed test dates, and it can be started early.

Instructional Materials: Detailed class notes; video lectures; in-lecture practice/application problems; supporting supplemental videos; videos talking/teaching through the process for processing/answering each practice problem in the practice sets; feedback and tutorials within Sapling online homework; videos talking through the process for processing/answering each of the practice test case study problems; textbook readings; textbook problems; solutions manual explaining/teaching the process for processing/answering practice problem in the book homework.

Activities/Practice: The course includes an extensive and diverse range of activities ("practice problems") to enable students to apply what they are learning, to practice the types of skills they will need, and to effectively prepare for the tests. These activities include: 1. Extensive in-lecture in-notes practice problems; 2. Practice sets online (≥4 per test; 3. Practice Tests (≥3 per test); 4. Sapling online homework problems; 5. "Quizzes" (open notes, take-home); and 6. Textbook practice problems. Of these the Sapling online homework and the "quizzes" are required and graded. All of the others have answer keys available. For practice sets and practice tests, online videos are provided walking through each problem. Of these, the Sapling online homework and the quizzes will be required and count towards your grade.

Self-Assessment: How do you know if you're mastering the material, and are eventually going to be prepared to score well on the tests? See whether you are consistently understanding and correctly answering the problems in the:
1. In-lecture problems; 2. Practice sets online; 3. Practice Tests; 4. Sapling online homework problems; and 5. Book practice problems.

Graded Assessment (Required Work): 1. Sapling online homework 2. Quizzes. 3. Tests.
The test scores will make up 80% of the class points. Sapling and the quizzes will combine for the other 20%.

COURSE OBJECTIVES / OUTCOMES / COMPETENCIES. By the end of the course, students should be able to do the following:

- See Test1-4 Objectives/Competencies as listed in the syllabus and on the main course website for more detailed listing of course objectives.

1. **Predict and explain Patterns and Properties**. Predict and explain patterns in shape, structure, bonding, hybridization, formal charge, stability, acidity, basicity, solubility, and reactivity for hydrocarbons, halocarbons, alkenes, dienes, and arenes, by understanding and applying concepts of organic chemical structure and bonding and stability.
2. **Predict reaction products**. Be able to predict products, including stereochemistry, in the reactions of alkanes, halocarbons, alkenes, dienes, and arenes.
3. **Classify, explain, and apply fundamental reactions.** Be able to recognize, classify, explain, and apply fundamental organic reactions such as S_N2, S_N1, E2, E1, alkene addition, electrophilic aromatic substitution, 1,2/1,4-additions, ring-opening, and radical halogenation. Be able to apply concepts associated with these general reaction types to product prediction, synthesis design, and reaction mechanism.
4. **Retrosynthetic analysis and Synthesis Design**. Use retrosynthetic analysis to design efficient multi-step syntheses involving halocarbons, alkenes, and arenes as intermediates or final products
5. **Draw Mechanisms.** Draw logical and detailed mechanisms for various fundamental reactions of alkanes, halocarbons, alkenes, dienes, and arenes.
6. **Apply Resonance and Conjugation.** Predict and explain patterns in stability, shape, hybridization, reactivity, and product formation when resonance or conjugation applies to a reactant, intermediate, or final product.
7. **Recognize Stereochemistry.** Classify molecules as chiral or achiral, identify chiral carbons as (R) or (S), identify relationships between pairs of molecules as enantiomers, diastereomers, or equivalent, and identify when a solution is racemic versus optically active.
8. **Apply Stability-Reactivity Principles**. Predict, explain, and rank the relative speeds of different chemical reactions by applying structure-dependent patterns in stability combined with application of mechanism recognition.
9. **Recognize Structure Relationships Between Chemicals**. Be able to recognize relationships between two chemical structures as the same structures, resonance structures, structural isomers, enantiomers, or diastereomers.
10. **Use Nomenclature**. Provide correct IUPAC names for alkanes, halocarbons, alkenes, and aromatics, including cyclic molecules and including stereochemistry.
11. **Recognize and Apply Functional Groups**. Classify organic molecules by their functional groups, and identify fundamental properties associates with those functional groups.
12. **Demonstrate Understanding in Scenarios Involving Alkanes, Alkenes, Alkyl Halides, Dienes, and Arenes.** Answer questions and explain/predict/apply physical properties, nomenclature, synthesis, reactions, mechanisms, and synthesis design/retrosynthesis to scenarios involving alkanes, alkenes, alkyl halides, dienes, and arenes.

Instructional Materials: Detailed class notes; video lectures; in-lecture practice/application problems; supporting supplemental videos; videos talking/teaching through the process for processing/answering each practice problem in the practice sets; feedback and tutorials within Sapling online homework; videos talking through the process for processing/answering each of the practice test case study problems; textbook readings; textbook problems; solutions manual explaining/teaching the process for processing/answering practice problem in the book homework.

Activities/Practice: The course includes an extensive and diverse range of activities ("practice problems") to enable students to apply what they are learning, to practice the types of skills they will need, and to effectively prepare for the tests. These activities include: 1. Extensive in-lecture in-notes practice problems; 2. Practice sets online (≥4 per test; 3. Practice Tests (≥3 per test); 4. Sapling online homework problems; 5. "Quizzes" (open notes, take-home); and 6. Textbook practice problems. Of these the Sapling online homework and the "quizzes" are required and graded. All of the others have answer keys available. For practice sets and practice tests, online videos are provided walking through each problem. Of these, the Sapling online homework and the quizzes will be required and count towards your grade.

Self-Assessment: How do you know if you're mastering the material, and are eventually going to be prepared to score well on the tests? See whether you are consistently understanding and correctly answering the problems in the:
1. In-lecture problems; 2. Practice sets online; 3. Practice Tests; 4. Sapling online homework problems; and 5. Book practice problems.

Graded Assessment (Required Work): 1. Sapling online homework 2. Quizzes. 3. Tests.

- The test scores will make up 80% of the class points. Sapling and the quizzes will combine for the other 20%.

TEST ONE SKILLS/OBJECTIVES / OUTCOMES / COMPETENCIES

Ch		**TEST ONE**	**Self-Assessment** (Some but not all Graded)	**Graded Assessment**
1	Structure Determines Properties	1. Identify number of bonds and lone pairs for uncharged 2nd-row atoms 2. Draw and interpret Lewis, condensed, and line-angle structural formulas, including those involving double or triple bonds. 3. Recognize when covalent versus ionic bonding exists 4. Recognize and calculate formal charges and lone pairs given bond connectivity 5. Populate lone pairs given formal charges and bond connectivity 6. Identify and draw resonance structures, and use them to predict stabilities. 7. Use arrow-pushing to display electron movement between resonance structures 8. Use principles of electronegativity to predict bond polarity, predominant resonance form, anion stability, anion basicity, and acidity 9. Use arrow-pushing to display electron movement in chemical reactions 10. Identify acids and bases, and predict whether an acid-base equilibrium will favor products or reactants 11. Predict relative acidities and basicities based on structure, bonding, charge, electronegativity, and resonance of conjugate acid-base pairs.	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	1. Sapling homework 2. Quiz 1 and Quiz 2 3. Test 1
2	Alkanes and Cycloalkanes: Introduction to Hydrocarbons	12. Predict the hybridization, electron geometry, and approximate bond angles relative to atoms in a molecule 13. Identify sigma versus pi bonds, and rank bond strengths 14. Draw 3-dimensional representation of given molecules, using the hash-wedge convention. 15. Identify polar and nonpolar molecules, and predict which ones can engage in hydrogen-bonding. 16. Predict general trends in the boiling points and solubilities of compounds, based on their size, polarity, and hydrogen-bonding ability. 17. Identify the classes of compounds, the "functional groups", including hydrocarbons and organic molecules containing oxygen or nitrogen, and draw structural formulas for examples 18. Identify when pairs of structures are related as structural isomers, stereoisomers, resonance structures, or as the same. 19. Correctly name alkanes and cycloalkane 20. Given the name of an alkane, draw the structure and give the molecular formula	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	1. Sapling homework 2. Quiz 2 3. Test 1
3	Alkanes and Cycloalkanes: Conformation and cis-trans Stereoisomers	21. Use Newman projections to compare the energies of alkane conformations 22. Draw best and worst Newman projections relative to any individual bond 23. Use torsional and steric strain terminology to explain differences in rotation barriers and in Newman-projection stabilities 24. Identify, name, and draw cis and trans stereoisomers of di-substituted cycloalkanes 25. Compare the energies of cycloalkanes, and explain ring strain 26. Draw accurate cyclohexane chair conformation, including cis- or trans-di-substituted cases, and including "left-" and "right-handed" chair conformations 27. Illustrate and identify axial versus equatorial substituents on cyclohexane chairs; and predict the most stable conformations of di-substituted cases. 28. Based on chemical formula, identify whether an alkane is cyclic or acyclic 29. Given a chemical formula for an alkane, draw and name structural isomers	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	1. Sapling homework 2. Test 1

TEST TWO SKILLS/OBJECTIVES / OUTCOMES / COMPETENCIES

Ch		**TEST TWO**	**Self-Assessment** (Some but not all Graded)	**Graded Assessment**
4	Alkyl Halides and An Overview of Chemical Reactions	1. Draw the mechanism and explain the energetics of the propagation steps in the free-radical halogenation of alkanes 2. Based on the selectivity of halogenation and the varying stabilities of 1º, 2º, 3º, and allylic radicals, predict the products of halogenation of hydrocarbons 3. Apply principles of bond strength to predict whether overall reactions or individual steps within a multi-step mechanism are exothermic or endothermic, are favorable or unfavorable, and use bond strengths to predict the energetics of reactions. 4. Given a rate law, predict how the rate would vary with changes in solute concentrations or solvent volume. 5. Use energy diagrams to discuss transition states, activation energies, intermediates, and the rate-determining step of a multistep reaction 6. Rank the stabilities of different radical, carbocations, or anions and describe or explain the structural features that stabilize them. 7. Use reactant and product stability-reactivity principles in conjunction with structural factors to compare the relative reactivities of different reactions 8. Predict and explain variations in bond strengths	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	Sapling homework Quiz 3 Test 2
5	Stereochemistry	9. Classify moleculas as chiral or achiral, and identify mirror planes of symmetry 10. Draw a mirror image for any molecule 11. Identify chiral carbons, and name them using the (R) and (S) convention 12. Identify relationships between pairs of molecules as enantiomers, diastereomers, or equivalent 13. Identify and identify meso compounds 14. Draw all stereoisomers for a given structure 15. Identify when a solution is racemic versus optically active 16. Identify when a chemical reaction will give a racemic versus optically active product Recognize and explain how various physical properties might vary or not vary for enantiomers, or for diastereomers.	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	Sapling homework Quiz 4 Test 2
6	Reactions of Alkyl Halides; Nucleophilic Substitutions and Eliminations	17. Correctly name alkyl halides, and identify halocarbons as 1º, 2º, 3º, allylic, vinyl, or aryl 18. Predict the products of S_N2 reactions, including stereochemistry. 19. Predict the products of S_N1 reactions, including stereochemistry. 20. Predict the products of E1 and E2 reactions, including stereochemistry. 21. Use Zaytsev's Rule to predict which structural isomer will predominate in E2 or E1 reactions. 22. When a halocarbon reacts, identify when S_N2 or E2 reactions occur, or when S_N1 or E1 reactions will occur, and predict the major products. 23. Draw mechanisms for any of S_N1, S_N2, E1, or E2 reaction 24. Rank the relative rates of substitutions or eliminations reactions, based on differences in substrate, base/nucleophile, leaving group, or solvent. 25. Predict whether a reaction will be first-order or second-order 26. When possible, predict predominance of substitution or elimination 27. Identify reactants that could product target chemical products 28. Design multi-reaction synthesis design sequences to convert hydrocarbons to more highly functional derivatives	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	Sapling homework Test 2

TEST THREE SKILLS/OBJECTIVES / OUTCOMES / COMPETENCIES

		TEST THREE	**Self-Assessment** (Some but not all Graded)	**Graded Assessment**
7	Alkenes: Structure and Preparation: Elimination Reactions	1. Calculate "elements of unsaturation" ("EU") for any formula. 2. Determine the number of alkenes and rings present in any formula, given its chemical formula and hydrogenation information. 3. Draw possible structural isomers for a chemical, given formula and hydrogenation information. ("Detective" problems.") 4. Draw and name all alkenes with a given molecular formula 5. Use the E-Z and cis-trans systems to name stereoisomers 6. Use heats of hydrogenation to compare stabilities of alkenes, or use stability patterns for alkenes to predict heats of hydrogenation or heats of combustion 7. Predict relative stabilities of alkenes and cycloalkenes, based on structure and stereochemistry 8. Predict the products of E2-elimination for haloalkanes, reactions (Zaytsev versus Hofmann elimination), depending on whether the base used is bulky or normal. 9. Predict the distribution between E2-elimination and S_N2 substitution for reactions of haloalkanes 10. Predict the major alkene products (Zaytsev elimination) when alcohols undergo acid-catalyzed dehydration. 11. Propose and draw detailed mechanisms for E2-elimination reactions of alkyl halides, and for acid-catalyzed E1 elimination of alcohols. 12. Propose and design effective single-step and multistep syntheses of alkenes. (Synthesis design problems.)	1. In-lecture problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	Sapling homework Test 3
8	Alkenes: Addition Reactions and Other Alkene Reactions	13. Predict the product when an alkene react with a hydrogen halides 14. Predict the products when alkenes react with HBr/peroxides 15. Predict the product when an alkene react with H_2O/H^+ 16. Predict the product when an alkene undergoes hydroboration/oxidation 17. Predict the products when alkenes undergoes oxymercuration/demercuration 18. Predict the product when an alkene undergoes hydrogenation 19. Predict the product when an alkene reacts with Cl_2 or Br_2 20. Predict the product when an alkene reacts with Cl_2 or Br_2 in the present of water 21. Predict the product when an alkene undergoes expodiation, with or without water present 22. Predict the product when an alkene undergoes ozonolysis 23. In all of the above reactions, include effective consideration of reaction orientation (Markovnikov versus anti-Markovnikov orientation), and stereochemistry 24. Predict when a reaction will produce achiral versus chiral products 25. Predict the correct stereoisomers for stereospecific reactions. 26. **Draw detailed logical mechanisms** for alkene reactions with HBr, H_2O/H^+, Br_2, or Br_2/H_2O. **27. Use retrosynthetic analysis to solve multi-step synthesis design problems involving alkenes as intermediates or final products** 28. Use clues provided by products of reactions such as ozonolysis to determine the structure of an unknown alkene 29. Determine the stereochemistry of a starting alkene, given reactants and the product stereochemistry.	1. In-lecture problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	Sapling homework Test 3

TEST FOUR SKILLS/OBJECTIVES / OUTCOMES / COMPETENCIES

		TEST FOUR	**Self-Assessment** (Some but not all Graded)	**Graded Assessment**
15	Conjugation in Alkadienes and Allylic Systems	1. Recognize when conjugation applies, how it impacts chemical stability, and use it to predict and rank stabilities of various substances 2. For compounds containing nitrogen atoms, determine what the nitrogen atom hybridization and shape is; determine what the lone pair hybridization is; and predict whether the nitrogen basicity is normal or low 3. Predict and rank how various reactions and their reaction rates are impacted by conjugation/resonance, whether in a reactant or an intermediate or a product, for example in SN1 reactions, radical reactions or acid-base reactions 4. Predict the products of hydrogen halide additions to conjugated dienes. 5. Identify 1,2 vs 1,4 addition products in hydrogen halide additions to conjugated dienes 6. Identify thermodynamic versus kinetic products 7. Predict the products of allylic radical bromination reactions. 8. Draw mechanisms for addition reactons or SN1 reactions proceeding through allylic cations 9. Draw resonance structures for allylic cations, radicals, or anions 10. Predict the products of Diels-Alder reactions, including stereochemistry; and when the dienophile is disubstituted. 11. Identify reactants involved in Diels-Alder reactions, allylic bromination reactions, and hydrogen halide additions to conjugated dienes.	1. In-lecture problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	Sapling homework Test 4
16	Arenes and Aromaticity	12. Name aromatic molecules, and draw structures given names 13. Use the polygon rule to draw the energy diagram for a cyclice system of p orbitals, and fill in the electrons to show whether a given compound or ion is aromatic or anti-aromatic 14. Use Huckel's rule to identify whether a given structure is aromatic, anti-aromatic, or non-aromatic, including heterocycles and ions 15. Apply understanding of how aromaticity or anti-aromaticity in a reactant, intermediate, or product impacts reactivity and reaction rates, for example in SN1 reactions or acid-base reactions 16. For compounds containing nitrogen atoms, determine what the nitrogen atom hybridization and shape is; determine what the lone pair hybridization is; and predict whether the nitrogen basicity is normal or low	1. In-lecture problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	Sapling homework Test 4
17	Reactions of Arenes: Electrophilic Aromatic Substitution	17. Predict products for the common electrophilic aromatic substitutions: halogenation, nitration, sulfonation, alkylation, and acylation. 18. Predict the position of substitution involving rings that have more than one substituent. 19. Draw the mechanisms for the electrophilic aromatic substitution reactions. 20. Draw resonance structures for the cationic intermediates involved in electrophilic aromatic substitution reactions on substituted rings. 21. Identify and apply which substituents are electron donors and electron withdrawers; activators versus deactivators; and ortho/para directors versus meta directors for electrophilic aromatic substitution reactions. 22. Predict products and utilize in synthesis design problems the common aromatic support reactions: reduction of nitro groups to amino; reduction of acyl group to 1º alkyl; oxidation of alkyl groups to carboxyl; desulfonation; allylic bromination. 23. Retrosynthesis/Synthesis design: design syntheses towards specific aromatic targets with appropriate ortho, meta, or para subsitution, by using appropriate reactants and appropriate reaction sequencing	1. In-lecture problems 2. Practice sets online 3. Practice Tests 4. Sapling homework problems 5. Book practice problems	Sapling homework Test 4

MSUM Sexual Violence Policy: Acts of sexual violence are intolerable. MSUM expects all members of the campus community to act in a manner that does not infringe on the rights of others. We are committed to eliminating all acts of sexual violence.

MSUM faculty and staff are concerned about the well-being and development of our students. We are obligated to share information with the MSUM Title IX Coordinator in certain situations to help ensure that the students' safety and welfare is being addressed, consistent with the requirements of the law. These disclosures include but are not limited to reports of sexual assault, relationship violence, and stalking.

If you have experienced or know someone who has experienced sexual violence, services and resources are available. You may also choose to file a report. For further information, contact Lynn Peterson, Coordinator of Sexual Assault Services at Hendrix Clinic and Counseling Center, 218-477-2211, or Ashley Atteberry, Title IX Coordinator in Owens Hall 208 (218-477-2174; ashley.atteberry@mnstate.edu). Additional information is available at: www.mnstate.edu/titleix