ORGANIC CHEMISTRY II ONLINE SUMMER: CHEMISTRY 360-SYLLABUS
Online Class - Summer 2025 (Course ID = 000059, CHEM360-01)

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Course Description: **CHEM 360. Organic Chemistry 2. 3 Credits**. The structure, nomenclature, reactions, reaction mechanisms, and synthesis of carbon compounds that contain oxygen and nitrogen. Prerequisites: CHEM 350 (Organic Chemistry I).

Required/Recommended Text and Materials:

1) Required online "ACHIEVE/SAPLING" homework. https://achieve.macmillanlearning.com/, 2025 Course ID = fsoyaj

2) Recommended Text: "Organic Chemistry", Wade+Simek", 9th edition, Pearson. 8th or 7th edition of Wade is fine; or a version of Klein's Organic Chemistry as used at NDSU; or certain other texts, contact me to maybe use what you have.)

- Note: For more details and purchase links, see: http://web.mnstate.edu/jasperse/Required-Text-and-Materials.pdf
- Problem listing from other textbooks: https://web.mnstate.edu/jasperse/Chem360/OtherTexbooks.htm

3) Solutions Manual: Get a solutions manual that matches the textbook edition you get.

Test Schedule

Test #1 (100 pts)	Ch. 10 Structure and Synthesis of Alcohols Ch. 11 Reactions of Alcohols
Test #2* (**50** pts)	Ch. 13 Nuclear Magnetic Resonance Spectroscopy Ch. 12 Infrared Spectroscopy
Test #3 (100 pts)	Ch. 18 Ketones and Aldehydes Ch. 22 Alpha Substitutions and Condensations of Enols and Enolate Ions
Test #4 (100 pts)	Ch. 19 Amines Ch. 20 Carboxylic Acids Ch. 21 Carboxylic Acid Derivatives

- See later pages for suggested 5-, 8-, 10-, or 11-week testing schedules. The schedule is very flexible.
- See later pages for a longer, more detailed description of course topics and objectives.

Grading Summary		Tentative letter grades	
Tests 1-4	350 points	A/A-	≥90%
Take-Home Quizzes	20 points	B-/B/B+	≥80%
Online homework	50 points (prorated)	C-/C/C+	≥70%
No cumulative final	420 Points Total	D-/D/D+	≥56%

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

Jasperse website: https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/

Or "classic" site: http://web.mnstate.edu/jasperse/Online/chem360online-Summer.htm Both websites sites provide links to:

Notes for use in class	Recorded Lectures	ACHIEVE/Sapling	Quizzes
Practice Tests	Practice Sets	Jasperse Schedule	Textbook Info, etc.

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Student Learning Outcomes/Course Objectives: The is the second semester of a fairly standard two-semester lecture course designed for science majors, including chemistry and biology majors, and including those preparing for health professions. (No online lab is included.) A more detailed list of learning topics is summarized on page 3, with an approximate lecture-by-lecture listing of topic coverage, and is detailed more fully on pages 20-25.

Coverage includes nomenclature, structure, properties, and the synthesis, reactions, and reaction mechanisms of organometallics, alcohols, aldehydes, ketones, amines, carboxylic acids, and carboxylic acid derivatives. Spectroscopy is covered. Reactions covered include redox reactions; Grignard and organometallic reactions; cationic and anionic addition, elimination, and substitution reactions; Wittig reactions; aldol, Claisen and other enolate reactions; and hydrolysis reactions among others. Reaction mechanisms are emphasized. Product prediction, synthesis design, and retrosynthesis skills are emphasized. Structure, stability, relative reactivity, and acid-base chemistry are included

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

Video	Topic		Reading
	Organic Chemistry 1, Jasperse, Wade Version 9 For other editions of Wade, or some other usable textbooks, see: http://web.mnstate.edu/jasperse/Chem350/Other-Textbooks.html		
	TEST 1 LECTURES. Alcohol Chemistry. Synthesis, Reactions, Retrosynthesis		
1	Intro; Structure, Nomenclature, Properties, Weak Acidity of Alcohols		10.1-10.6
2	Synthesis of Alcohols; Organometallic Reactions.		10.7-10.9
3	Synthesis of Alcohols; Organometallic Reactions.		10.7-10.9
4	Side Reactions; Reduction of Carbonyl Compounds		10.10-10.11
5	Oxidation of Alcohols		11.1-11.3
6	Conversion of Alcohols to Tosylates or Halides; Uses of Tosylates and Halides		11.5-11.9
7	Miscellaneous; Chemical Tests; Multistep Synthesis		11.10, 11.14
8	Retrosynthetic Analysis		
9	Catchup, Multistep Synthesis Problems		Catchup
10	Review for Test 1		---
	Additional Practice Sets/Videos: Retrosynthesis Problems; Acid-Base Practice; Mechanisms Problems **Test 1 Practice Tests**: V1, V2, V3, V4		
	TEST 2 LECTURES. NMR and Spectroscopy		
11	1H NMR Overview: Chemical Shift, Integration, and Splitting; 1H NMR Problem Solving		13.5-8
12	H-NMR Interpretation and Problem Solving		13.5-8
13	Overlap, Symmetry, Integration, Splitting, Spectrum Prediction		13.5-8
14	More Problem Solving; Complex Splitting; Stereochemical Nonequivalence of Protons		13.9-10
15	13C NMR; Infrared Spectroscopy		13.12-14
16	Spectroscopy Catchup, Integrated Problems		catchup
	Additional Practice Sets/Videos: Jasperse NMR Problems (>40 pages) **Test 2 Practice Tests**: V1, V2, V3, V4		
	TEST 3 LECTURES. Carbonyls Chemistry; Enolates.		
17	Ketones/Aldehydes. Nomenclature, Properties, Intro.		18.1-7
18	Synthesis of Ketones/Aldehydes.		18.7-11
19	Reactions of Ketones/Aldehydes		18.12-17
20	Carbonyls, Carbohydrates, and Condensation Polymers		18.19-20
21	Catchup; Enols and Enolates Intro. Acid/Base Considerations; Proton as Electrophile		22.1-2, 22.15
22	Enols and Enolates Intro. Acid/Base Considerations; Proton as Electrophile		22.1-2, 22.15
23	Halogenation; Alkylation; Double Activation; Ester Hydrolysis; Decarboxylation		22.3, 5, 15-17
24	The Aldol Reaction (Aldehyde/Ketone as Electrophile)		22.7-11
25	Claisen Reaction (Ester as Electrophile)		22.12-17
26	Catchup		
27	The Wittig Reaction and Alkene Synthesis; Catchup		18.18
28	Catchup, Integrated Practice Problems.		Catchup
	Additional Practice Sets/Videos: Mechanism Practice (Many); Retrosynthesis Practice **Test 3 Practice Tests**: V1, V2, V3		
	TEST 4 LECTURES		
29	Amines. Intro, Nomenclature, Properties; Basicity of Amines; Structural Factors; Salts		19.1-7
30	Reactions of Amines. Proteins: Condensation Polymers of Amino Acids.		19.9-12, 16-17
31	Diazonium Chemistry; Amine Synthesis by Reductive Amination of Carbonyls		19.16-18
32	More Synthesis of Amines		19.18
33	Carboxylic Acids: Nomenclature; Properties; *ACIDITY*; Salts; Soap; SYNTHESIS		20.1-5
34	Acid Synthesis; Reactions		20.8-11
35	Reactions of Acids: Nucleophilic Acyl Substitution; Carboxylic Acid Derivatives		20.13-15; 21.1-3
36	Interconversions Among Acids and Derivatives; Synthesis and Mechanism; Catchup		21.5-7
37	Interconversions Among Acids and Derivatives; Synthesis and Mechanism; Catchup		21.5-7
38	Practice Problems		Practice
39	Polymers Chemistry. Addition, Condensation, and Biopolymers.		26.1-4, 24.8-10, 23.13
	Additional Practice Sets/Videos: Acid-Base Practice (Easy); Acid-Base Practice (Less Easy); Mechanisms, Retrosynthesis + Synthesis Design **Test 4 Practice Tests**: V1, V2, V3		
	There is NO Cumulative Final Exam for the Summer Course.		

Testing Options: Via Zoom, On-Site at MSUM, or Using a Proctor Local to You

1. **Testing:** The nature of organic chemistry requires drawing/illustrating complex structures for chemicals, and illustrating electron movements during reaction mechanisms. As such it is not conducive to multiple-choice or short-answer questions. Written tests can be taken either via Zoom, on-site at MSUM, or by using a proctor local to where you live.

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. **Testing Options**

   a. **Proctored Testing via ZOOM:** You make arrangements with me; I send you the test; and I monitor you online via ZOOM. This is especially practical during COVID-19 restrictions or quarantine. You wouldn't need to leave your home.
      a. My Zoom-room link: https://minnstate.zoom.us/j/8827046226
      b. Email me to suggest a couple of time slots that could work for you, and I'll try to find one that can fit.
      c. Sometimes by arrangement I'm willing to do testing on Saturdays at 9am central time, or on a weekday evening at 7pm.

   b. **Testing live at MSUM**: **Hagen 405/407J**.
      - I have a really nice conference room right next to my office.
      - Contact me regarding times that you might like.
      - I will always protect M/W/F at 10am, but feel free to suggest/request other times that work well for you.

   c. Live-Proctored Testing, local to you.
      1) This is not the normal process, but is an option for distance students in case, for whatever reason, the zoom-proctored testing is problematic.
      2) If necessary, this would typically take place at a local college, library, hospital, church or high school, etc., or with some other responsible individual.
      3) If necessary to use this process, **YOU** will need to email me the email, name, phone number, and job 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 email tests to the proctor who will print them. After a test is done the proctor will scan and email me the answers and destroy the printed

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. **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, and Zoom-proctored may have that option too, via zoom share-screen. 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)**: https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/ or "classic" site: http://web.mnstate.edu/jasperse/Online/chem360online-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 ("ACHIEVE/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. MSUM Registration for the class (assuming you are not an NDSU students registering via tricollege).
      - For distance students, or for NDSU students registering through MSUM (basically students who aren't already MSUM students):
      - http://web.mnstate.edu/jasperse/Online/RegistrationDistanceStudents-Summer.pdf
      - Jasperse video explaining:
        - https://mediaspace.minnstate.edu/media/Online-Registration-OVerview/1_upct9ngb
   b. Order books (used textbook and matching solutions manual).
      - More info + purchase links: http://web.mnstate.edu/jasperse/Required-Text-and-Materials.pdf
   c. Sign up for ACHIEVE/Sapling Online Homework: https://achieve.macmillanlearning.com/
   d. Print Syllabus: http://web.mnstate.edu/jasperse/Online/Syllabus360online-Summer.pdf
   e. Print Class Notes (double-side print, but best to do full-size):
      - http://web.mnstate.edu/jasperse/Online/Classbook-Chem360-online-summer.pdf
      - Buy a big 3-ring binder, and 3-hole punch notes so you can keep them all organized.
   f. Bookmark the main website:
      - https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/ or "classic" site: 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 main website, under "Organic Chemistry II - Test 1: Alcohol Chemistry…"
      - Maybe set the play speed at x1.5, or fast forward through parts!
   h. View Jasperse personal introduction video (with face showing! ☺):
      - https://mediaspace.minnstate.edu/media/350-online+Face-with-Voice-Personal-Intro/1_sasxj5r1

3. **Preparing for Test 1**
   a. Print To-Do Checklist for Test 1: http://web.mnstate.edu/jasperse/Online/Checklist-360Test1.pdf
   b. Review Skills/Competencies for Test 1: http://web.mnstate.edu/jasperse/Online/Objectives360-Test1.pdf
   c. Go through the lectures with the printed notes
      - https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/
      - After each lecture, review the material
   d. Do lots of Practice/Homework Problems
      - Many sample practice problems integrated into the lectures
      - Required ACHIEVE/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 is one for Test 1): http://web.mnstate.edu/jasperse/Online/Quizzes360Online.html
   f. Do the practice tests (there are four for Test 1)

- http://web.mnstate.edu/jasperse/Chem360/Practice%20Tests/Chem360PracticeTests.html

g. Arrange zoom-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 at MSUM or via Zoom.
- 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 August 1, 2025)

2. The "Official" semester start date is either May 15 (full-term section) or June 3 (8-week section), 2025
   - But you can start earlier, much earlier, if you want

3. Semester Completion date: August 1, 2025.
   a. You can finish early, and you can start early (or late), but you MUST FINISH BY AUGUST 1
   b. MSUM academic calendar: https://www.mnstate.edu/academiccalendars.aspx

4. YOU CAN START EARLY, AND/OR FINISH EARLY. (But must finish by August 1 deadline.)
   - I will try to have all course materials ready/online by Valentine's Day! ☺☺
   - 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 (August 1), 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 testing with me, whether on campus or via zoom, I will be super flexible. I will be normally be available for testing from 9am-2pm central time every Monday-Tuesday-Wednesday-Thursday. Most Fridays I will be available. Most weekdays I will be available till 5:30, and many weekdays I will have capacity for evening testing as well. Many Saturdays I am available for morning, 9am CST testing, too. So, good chance that I will be available at some times that can fit your schedule. ☺☺
   - You can adjust on the fly, to some degree. For example, suppose you were planning to take Test 1 on a Friday, but you realized that if you could study more over the weekend and take it on Monday instead, you might be much better prepared and 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 SCHEDULE TO 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.

8. TESTS WILL NOT BE RETURNED. Given the flexible test-scheduling, I will not be able to send you copies of your graded tests. Sorry. ☹ But whether testing on campus with me, or testing via zoom, I can usually grade it for you right away, so you can see how you did and get feedback. The share-screen capacity on Zoom is great for this.

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

Some Suggested Possible Schedules: Test Scheduling Possibilities (Overview):

	Using 50-minute MSUM Kaltura Videos https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/ or classic: http://web.mnstate.edu/jasperse/Online/Lectures360online.html
Test 1	Lectures 1-10 (under "Organic Chemistry II - Test 1…" pulldown)
Test 2	• Lectures 11-16 (under "Organic Chemistry II - Test 2…" pulldown)
Test 3	• Lectures 17-28 (under "Organic Chemistry II- Test 3…" pulldown)
Test 4	• Lectures 29-39 (under "Organic Chemistry II - Test 4…" pulldown)

5-week: (see following page 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 ACHIEVE/Sapling homework. You may also need to be using some weekend time.
- First 4-5 days: Go through all lecture videos, ACHIEVE/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 ACHIEVE/Sapling; review lecture video discussion on topics that don't make sense; do all the practice tests.
- Day 8: Take the actual test.
- Note: Test 2 is really a "half test" so should be completed more quickly
- Test 3 is very hard. It takes longer to understand and master the content. So, don't complete Test 2 behind schedule. Test 3 will take extra long; test 2 doesn't have nearly as many lectures and shouldn't take as long.

- Note: If you really want to complete both Organic I and Organic II during the summer, but the pacing required for successful completion by August 1 proves to be too fast, contact Dr. Jasperse to discuss possible workarounds.

8-week: (see following page for more detailed suggested schedule)

- ~Two weeks per test
- 8 days : Go through all lecture videos, ACHIEVE/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 ACHIEVE/Sapling; review lecture video discussion on topics that don't make sense; do all the practice tests.
- Day 14: Take the actual test.
- Note: Test 2 is really a "half test" so should be completed more quickly, in less than two weeks
- Test 3 is very hard. It takes longer to understand and master the content. So don't complete Test 2 behind schedule. Test 3 will take extra long; test 2 doesn't have nearly as many lectures and shouldn't take as long.

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

- This is my recommended plan for students just trying to complete Organic II (but not Organic I!)
- This would involve starting in mid-May (May 15?) and finishing July 19.
- Two-and-a-half weeks per average test (17 days)
- Days 1-11: Go through all lecture videos, ACHIEVE/Sapling online homework, and extra practice sets.
- Days 12-16: Study a lot; go through all the practice sets; complete any quizzes or incomplete ACHIEVE/Sapling; review lecture video discussion on topics that don't make sense; do all the practice tests. Then take the actual test.
- Note: Test 2 is really a "half test" so should be completed more quickly

~11-week: (see two pages later for more detailed suggested schedule)

- This would involve starting mid-May (May 13?), and then using the most unrushed pace to finish by August 1.
- ~Two-and-a-half weeks per test (17 days)
- Days 1-11: Go through all lecture videos, ACHIEVE/Sapling online homework, and extra practice sets.
- Days 12-16: Study a lot; go through all the practice sets; complete any quizzes or incomplete ACHIEVE/Sapling; review lecture video discussion on topics that don't make sense; do all the practice tests. Then take the actual test.
- Note: Test 2 is really a "half test" so should be completed more quickly

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 or even two weeks before the August 1 deadline, and give some July and August free!
- Geared for students who are just taking Organic II, but not also Organic I
- Note: It's really easy to have a plan but then to fall behind. It is wise to plan complete all the 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 II! By planning to finish somewhat early, it prevents that course finish from catching you by surprise.
- **This should involve about 6 lectures per week.**

	Using 50-minute MSUM Kaltura Videos https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/ or classic: http://web.mnstate.edu/jasperse/Online/Lectures360online.html
Test 1 Friday June 6	• Lectures 1-10 • Finish lectures/ACHIEVE/Sapling by/before Friday, May 30 • Digest/Practice/Integrate Friday-till-test
Test 2 Wednesday June 18	• Lectures 11-16 (short, fewer, limited content) • Finish lectures/ACHIEVE/Sapling by/before Wednesday, June 11 • Digest/Practice/Integrate Wednesday-till-test
Test 3 Wednesday July 9	• Lectures 17-28 (longer, harder; much content) • Finish lectures/ACHIEVE/Sapling by Wednesday, July 2 • Digest/Practice/Integrate Wednesday-till-test
Test 4 Friday July 25	• Lectures 29-39 • Finish viewing lectures by Friday, July 18 • Digest/Practice/Integrate rest of week

Suggested ~11-week Schedule: For students who want to complete Organic II (but not also Organic I during the same summer) in the most unrushed pace.

- Note: It's really easy to have a plan but then to fall behind. It is wise to plan to 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 Kaltura Videos https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/ or classic: http://web.mnstate.edu/jasperse/Online/Lectures360online.html
Test 1 Monday June 9	• Lectures 1-10 • Finish lectures/ACHIEVE/Sapling by/before Monday, June 2 • Digest/Practice/Integrate Tues-till test
Test 2 Friday June 20	• Lectures 11-16 (short, fewer, limited content) • Finish lectures/ACHIEVE/Sapling by/before Fri, June 13 • Digest/Practice/Integrate Sat-till-test
Test 3 Wednesday July 16	• Lectures 17-28 (longer, harder; much content) • Finish lectures/ACHIEVE/Sapling by Friday, July 9 • Digest/Practice/Integrate Friday-till-test
Test 4 Friday August 1	• Lectures 29-39 • Finish viewing lectures by Friday, July 25 • Digest/Practice/Integrate rest of week

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 ACHIEVE/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 August 1, 2025. **Possible 5-week Schedule: June 23-August 1**

Possible/Suggested 8-week Schedule (you can personalize it):

- **This should involve an average of at least one video lecture per day, weekends included.**
- This schedule uses 8 weeks. It assumes not also taking CHEM350 during same summer.
- 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 Kaltura Videos https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/ or classic: http://web.mnstate.edu/jasperse/Online/Lectures360online.html
Test 1 Monday June 16	• Lectures 1-10 • Finish lectures/ACHIEVE/Sapling by Tuesday, June 10 • Digest/Practice/Integrate Tuesday-till-test
Test 2 Wednesday June 25	• Lectures 11-16 (short, fewer, limited content) • Finish lectures/ACHIEVE/Sapling by Saturday, June 21 • Digest/Practice/Integrate Saturday-till-test
Test 3 Friday July 11	• Lectures 17-28 (longer, harder; much content) • Finish lectures/ACHIEVE/Sapling by Sunday, July 6 • Digest/Practice/Integrate Sunday-till-test
Test 4 Friday July 25	• Lectures 29-39 • Finish viewing lectures by Monday, July 21 • Digest/Practice/Integrate Mon-Thurs

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 ACHIEVE/Sapling homework. Then you'd have several days to study for tests.
- On this schedule you might routinely be going through ≥one lecture video (~hour-long) per day, plus
- The lecture videos will be available by Feb 14, so you are welcome to start (and finish?) way early if you wish

You can adjust the schedule to some degree to fit your schedule and your ability to prepare for specific tests.

Possible 5-week Schedule: June 23-Aug 1

- **Geared towards students who are taking BOTH CHEM350 and CHEM360 during the same summer**
- This schedule assumes use of ~5 weeks to complete CHEM360, beginning on June 23, and finishing on August 1. It assumes using the five weeks from May 15-June 23 to complete CHEM341-online.
- **Starting sooner would sure help!**

	Using 50-minute MSUM Kaltura Videos https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/ or classic: http://web.mnstate.edu/jasperse/Online/Lectures360online.html
Test 1 Tuesday July 2	• Lectures 1-10 • Finish lectures/ACHIEVE/Sapling by/before Thursday, June 19 • Digest/Practice/Integrate Thursday-till-test
Test 2 Wednesday July 9	• Lectures 11-16 (short, fewer, limited content) • Finish lectures/ACHIEVE/Sapling by Sunday, July 6 • Digest/Practice/Integrate Sunday-till-test
Test 3 Wednesday July 23	• Lectures 17-28 (longer, harder; much content) • Finish lectures/ACHIEVE/Sapling by Saturday, July 19 • Digest/Practice/Integrate Sunday-till-test • Lots of material on this one, so aggressive start and more time needed than for earlier tests.
Test 4 Friday August 1	• Lectures 29-39 • Finish viewing lectures by Monday, July 28 • Digest/Practice/Integrate Tuesday-till-test

Notes on the 5-week schedule:

- On this schedule you might routinely be going through two-three lecture videos (hour-long) per day, plus reviewing them and doing ACHIEVE/Sapling homework. You may also need to be using some weekend time.
- Starting sooner than June 20 would help a lot. Starting Organic I early would relieve pressure on both O1 and O2.
- Normally you want to get through all of the lectures and ACHIEVE/Sapling homework material well before taking a test. Protect several days for reviewing, studying, putting it all together, practicing, doing practice tests, etc..
- Note: If you really want to complete both Organic I and Organic II during the summer, but the pacing required for successful completion by August 1 proves to be too fast, contact Dr. Jasperse to discuss possible workarounds.

On-Line Lectures: https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/
or classic: http://web.mnstate.edu/jasperse/Online/Lectures360online.html

1. These are normally recorded "Kaltura" lectures from an earlier 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. Because the video lectures were actually recorded previously, they often mention ACHIEVE/Sapling due dates, test days, or days of the week that won't make any sense to you. Beware of those!
3. While there are additional study materials and videos, the main lecture videos are normally 50-minutes in length.
4. There are 39 such lectures.
5. "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!
6. **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**..
7. There are several display options, including full screen.
8. Lectures will default to showing captioning; you can turn that off if you prefer
9. There are also play-speed options. If I'm lecturing too slowly, you can speed it up.
10. The ability to pause and rewind is really helpful for difficult topics.
11. **Kaltura videos can be downloaded to your computer as mp4 files 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 as mp4 files 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, etc., you'll still be able to view the videos! ☺
    - A "download" command will appear below the video display ***if*** you are logged into D2L or media space.
    - To download, you must be logged into Minnesota State Media Space using your StarID.
        a. Easy way: With a class Kaltura video open, (NOT in full-screen mode), the right-hand corner will say "guest" or show a login icon (or your name if already logged in). Click, then enter StarID and password to login. Once logged into Media Space, then when you open a video the "download" button will appear below the video display screen.
            - Once logged into Media Space, you'll stay logged in for a while. So, if you're trying to download 20 videos, for example, you could log in once, then download all 20 of them...
        b. Or you could sign into D2L using StarID: https://mnstate.learn.minnstate.edu/
        c. Here's a video showing the process:
            - https://mediaspace.minnstate.edu/media/How+to+Download+Kaltura+Videos/1_b366psck

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

- These are pretty standard videos. So, if you have internet access, you should be fine.
- Kaltura test (this is just a standard video):
    - https://mediaspace.minnstate.edu/media/360-AL05-Alcohol-to-Alkoxide-Ether/1_6le0fu0n
- To be able to download as mp4 files, see note above.
- While Kaltura doesn't have a specific "diagnostics" page, there is a nice "Tegrity" diagnostic page.
    - https://athens.tegrity.com/#/diagnostic
    - Tegrity is a different video-server than Kaltura. But usually if your device satisfies all or most of the the Tegrity diagnostics check boxes, it will also be suitable for Kaltura videos.
    - 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 ACHIEVE/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 Kaltura Videos https://collaborate.mnstate.edu/public/blogs/jasperse/online-organic-chemistry-courses/online-organic-chemistry-ii-360-summer/ or classic: http://web.mnstate.edu/jasperse/Online/Lectures360online.html
Test 1	Lectures 1-10 (under "Organic Chemistry II - Test 1…" pulldown)
Test 2	• Lectures 11-16 (under "Organic Chemistry II - Test 2…" pulldown)
Test 3	• Lectures 17-28 (under "Organic Chemistry II- Test 3…" pulldown)
Test 4	• Lectures 29-39 (under "Organic Chemistry II - Test 4…" pulldown)

In-Class Notes: http://web.mnstate.edu/jasperse/Online/Classbook-Chem360-online-summer.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/Chem360/Practice%20Tests/Chem360PracticeTests.html

- All practice tests in a single document: http://web.mnstate.edu/jasperse/Online/PracticeTests-All-Chem360.pdf
- All practice-test answer keys in a single document:
  - http://web.mnstate.edu/jasperse/Online/PracticeTests-Answers-All-Chem360.pdf

1. There are three or 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: Available from main website, or from single-document links below:

- All practice sets in a single document: http://web.mnstate.edu/jasperse/Online/Practice-Sets-All-Organic-Chemistry-2.pdf
- All practice-set answer keys in a single document:
  - http://web.mnstate.edu/jasperse/Online/Practice-Sets-Answers-All-Organic-Chemistry-2.pdf
- Between ACHIEVE/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 ACHIEVE/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 ACHIEVE/Sapling problems don't have the same kind of commentary available.

ACHIEVE/Sapling On-Line Homework: . https://achieve.macmillanlearning.com/
More details on a later page. ACHIEVE/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 ACHIEVE/Sapling homework also provides an effort-driven opportunity to earn some points! (ACHIEVE/Sapling averages are typically much higher than test averages.)

ACHIEVE/SAPLING OnLine Homework, version 2025

- ACHIEVE/Sapling should be ready at least by March 1, and can be sooner by request.

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

1. Website: https://achieve.macmillanlearning.com/
2. Sign in
3. Have "VIEWING BY" set as "Assignments"
4. Miscellaneous:
   - You can try a problem as many times as you like. But the scoring will cost you only 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 do not need to complete a chapter assignment at a single time. You can do as much as you like; leave; and return as you like.
   - ACHIEVE scores will not appear in your D2L grade records until after you've completed all of the assigned ACHIEVE work.
   - For course points, your ACHIEVE points will equal ACHIEVE % x 80.
     - So, for example, 100% x 80 = 80/80; 90% x 80 = 72/80, etc..

How to enroll into the ACHIEVE/Sapling online homework problems required for this course:

Short Synopsis:

1. Go to: https://achieve.macmillanlearning.com/
2. Click on **"I Need to Enroll in a Course"**
3. Enter your course ID as given to you by your instructor (see website, syllabus, email, or request)
   a. Course ID for Summer 2025: fsoyaj
4. You then have two options:
   a. Purchase Access Online: Select the access period you want to buy. Add it to your cart. Create an account. Follow the check-out process.
   b. Already have a code: Simply enter in the code you have either purchased or received. Create an account and you're in.

Longer with More Step-by-Step Details:

1. Go to: https://achieve.macmillanlearning.com/
2. Click on **"I Need to Enroll in a Course" (**in the lower left quadrant)
3. Enter the Course ID (this is specific/unique to each course).
   a. Course ID for Summer 2025: fsoyaj
4. Click "Purchase Achieve Access" button
   - This is the most direct, cheapest payment and the way to go.
     - The "enter access code" would apply if you purchased access from the bookstore. Hopefully the bookstore will have access code cards, but I'm not totally sure?
5. Add it to your cart.
   - If first time using "Achieve", you may need to fill in account information, with email and password and stuff at this point? Or maybe that will happen later….
   - Note: *IF* it's Organic I you are adding, there will be an option to buy two-semesters worth of access at a reduced cost.
   - If it's O2 you are adding and you'd previously paid for 2-semesters access, you'll get a button that prompts you to use that previous payment.
6. Checkout.
7. Create Account or Sign In

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 ACHIEVE/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 ACHIEVE/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. Do them all!
   - http://web.mnstate.edu/jasperse/Chem360/Practice%20Tests/Chem360PracticeTests.html
   - All practice tests in a single document:
     - http://web.mnstate.edu/jasperse/Online/PracticeTests-All-Chem360.pdf
   - All practice-test answer keys in a single document:
     - http://web.mnstate.edu/jasperse/Online/PracticeTests-Answers-All-Chem360.pdf
8. Do absolutely all of the practice sets, which are excellent rehearsal for the real tests.
   - Available from main website, or from single-document links below:
   - Practice sets in a single document: http://web.mnstate.edu/jasperse/Online/Practice-Sets-All-Organic-Chemistry-2.pdf
   - Practice-set answer keys in a single document:
     - http://web.mnstate.edu/jasperse/Online/Practice-Sets-Answers-All-Organic-Chemistry-2.pdf

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 actual 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 ACHIEVE/Sapling homework will not be sufficient**.

ORGANIC CHEMISTRY II PROBLEMS, USING WADE 9

Based on Organic Chemistry (9th Edition) by L. G. Wade Jr

Note: if you have the 8th, 7th or 6th edition of Wade, or if you have a Klein textbook as used at NDSU, lists of problems are linked from the following website, or you can email me (jasperse@mnstate.edu) to get the list.) Contact me if that's your situation, or see the following link:

- https://web.mnstate.edu/jasperse/Chem360/OtherTexbooks.htm

Note: for some links to buy variably new or perhaps older edition of the textbook and the associated solutions manuals, see: https://web.mnstate.edu/jasperse/Required-Text-and-Materials.pdf

Chapter Topic	Wade Chap	Wade 9 Problems In the Chapter	Wade 9 Problems Back of the Chapter
Structure and Synthesis of Alcohols	**10**	1, 5d, 6, 8, 10, 12a,b,d, 13-16, 17 (esters only), 18-20, 22-26	30, 32a-d, 33b,c, 34a,c, 33b,c, 36a-l, 38 (review from alkenes), 39, 40, 42, 43, 56, 57 (skip d)
Reactions of Alcohols	**11**	1a,b,d, 2, 3, 4.1,2, 5a,b, 6, 9, 10, 11, 12a, 13, 14, 22, 23, 26a, 33, 34, 35, 36, 37, 38	39 (skip g), 41 (do the bromides only), 42, 43, 44, 48a, b, c, f, g, h, 49, 50, 52, 53, 56
Nuclear Magnetic Resonance Spectroscopy	**13**	2, 3, 4, 5, 6, 7, 8, 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
Infrared Spectroscopy	**12**	4, 5	16
Ketones and Aldehydes	**18**	1a,b, 6, 7, 8, 9, 11, 13a, 14, 16a, 17, 19, 20, 21, 22a,b,d, 23, 24, 25, 26, 27, 28, 29a-d, 34a-c, 36a	38a-c, e-g, l, 39a,e, 40, 41, 43, 44, 47a,c,d, 49, 50a,b,d,e, 51a-f,h, 52, 53a-g, i-l, 54a-e, 55a,c,d,e,f 57, 58, 59, 64a-d, 65, 67a,b
Alpha Substitutions and Condensations of Enols and Enolate	**22**	(Enols, Halogenation) 1, 2, 3, 5, 10, 11, 12, 13, 14, (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, Ch 18.32, 33 (Wittig)	60, 61, 62, 63, 64, 65, 67 (Basically draw the dicarbonyl precursor), 68, 69 (skip b,e,i), 71a, d, e, 72, 73, 77a-c
Amines	**19**	1,2(skip b,d), 3a-c, 5b,c, 6a-c, 15, 16, 17, 26, 27, 28, 30a-c, e-g, 31	32a-e, 33, 34, 37a,c,d 38a, h,i, j,l,m ($NaBH(OAc)_3$ = NaBH3CN), p, q, 40f, 42a,d,g, 47
Carboxylic Acids	**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	25 (not d,g, i), 26a,b,c,f,g, (IUPAC only), 27a,e,f,h,I, 28, 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, 44, 47
Carboxylic Acid Derivatives	**21**	1a-c, 6-14,16, 18, 31, 32a,b	42a-c, 43a,c,d,e,f, 44, 45a,e,f, 46, 47 (saponification is NaOH/H2O hydrolysis), 48a,b, 49a,b,d, e, 50a,b,c,e,f,g,h, j, l, 54a,c,d,f,j, 55, 57a-c

Getting Help, Office Hours, Course Communications:

1. Live Face-to-face office hours:
   - M-H 9:30-12:00 (but available most other afternoons too, and Fridays, upon request….)
   - MSUM office: Hagen 407J. Phone 218.477.2230
   - Zoom-Room: https://minnstate.zoom.us/j/8827046226

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 ACHIEVE/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. ACHIEVE/Sapling: If you email screen shots of problems or "why-is-this-answer-marked-wrong", I can sometimes explain why they're wrong and what you should have done instead
   d. Zoom-Room: https://minnstate.zoom.us/j/8827046226
   e. Online office hours: 9:30-12:00. (But most days I'll be in 9-5:30…)

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.

Minnesota State University Moorhead is accredited by the Higher Learning Commission and is a member of the North Central Association of Colleges and Schools. https://www.mnstate.edu/about/accreditation.aspx

American Chemical Society certified: Minnesota State University Moorhead's Chemistry BS degree 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-certified.

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:

- NDSU: The normal MSUM-registration process (steps 1 + 2) works for NDSU students

1. **APPLY TO MSUM as a "Non-degree seeking student"**: https://www.mnstate.edu/admissions/apply-now/. (Select "Undergraduate Application", then "non-degree seeking student").
   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!)**
      - https://eservices.minnstate.edu/adm/public/studentWelcome?campusId=072&appType=undergrad&_ga=2.206061393.33361417.1599496993-2046871640.1599278883
      - Don't bother 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
      - $20 fee at the end; should be box that says "Pay Now"; click on that and be able to submit payment
   b. You will not need to send official transcripts from your school for MSUM application.
   c. Approval normally takes 1-3 business days, but may be expedited. You will be notified by email.
   d. Deadlines: MSUM application by June 3 is preferred; later applications through July 13 will also work.
      - For later application, a contact person to expedite admission is Alex Elness in admissions. (Email: alexander.elness@mnstate.edu; phone/text 218.304.0104).

2. **REGISTER FOR THE COURSE(S):** http://www.mnstate.edu/eservices/
   a. You'll need your StarId and password to login.
   b. Admission into MSUM must be completed before you can register.
   c. Registration for summer classes opens before January 1, 2025
   d. Pay: If you don't complete your payments, your grade will never be released! (Plus a late-payment fee.)
   e. Can pay online (https://www.mnstate.edu/eservices/), or use debit/credit card on phone to business office: 218.477.2242.
   f. Payment reminders are emailed to your MSUM email, which you may not check? So, remember to pay!
   g. Deadline: Class registration should be completed by June 7 (barring late-registration workaround)
      a. To request late- registration workaround after Jun 7, contact me, Dr. Jasperse jasperse@mnstate.edu.

3. **Tuition+Fees: Varies by State. (Numbers listed are for Summer 2025, and won't inflate until Fall 2025 …).**
   - ~$1119.36: Minnesota, SD, ND, and WI (reciprocity states).
   - ~$2003.13: Other states.

4. **For NDSU Students: Does Tri-college Or Metro College Alliance work?**
   a. Direct enrollment (to MSUM, see above) always works.
   b. If an NDSU student applies to MSUM as a "non-degree-seeking-student", as described above, he/she can take this course (and pay MSUM's lower-than-NDSU summer tuition rate!). No problem. After the course is completed, the grade can be sent to NDSU and will be accepted by NDSU.
   c. But registration via the Metro College Alliance process (formerly called "Tri-College"), in which a student pays NDSU tuition to take an MSUM course, will not work for summer courses.
   d. If you register via MSUM, the class will be accepted toward NDSU class requirements, but the grade will not be calculated into your NDSU GPA, nor will it replace previous grades from Chem341 at NDSU.

- **(Craig: Price Link:** https://www.mnstate.edu/cost-aid/undergraduate/)
   e. **NDSU price link: https://www.ndsu.edu/sites/default/files/onestop/tuition/rates/tuition-2025-ugrd_0.pdf**

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-summer.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
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 file version of Kaltura videos.
   - Example video: https://mediaspace.minnstate.edu/media/350+AL02.+Normal+Bonding,+Formal+Charge,+Structural+Formulas/0_9sfkh015
   - Click on guest/login in upper right corner; Star ID login to Media Space; download available below video.
   - 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. ACHIEVE/Sapling: https://macmillanlearning.com/support
   - mailto:support@ACHIEVElearning.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
- 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
- ACHIEVE/Sapling Online HomeworK
  Accessibility: https://www.macmillanlearning.com/college/us/our-story/accessibility

Modestly Used Technologies:

- D2L Brightspace
  Privacy: http://www.brightspace.com/legal/privacy/
  Accessibility: http://www.brightspace.com/accessibility/
  http://www.brightspace.com/accessibility/standards/

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

- 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 360. Organic Chemistry 2. 3 Credits**. The structure, nomenclature, reactions, reaction mechanisms, and synthesis of carbon compounds that contain oxygen and nitrogen. Prerequisites: CHEM 350 (Organic Chemistry I).

Instructor Description: The course is the second semester of a fairly standard two-semester lecture course in organic chemistry, designed for science majors, including those preparing for health professions. (No online lab.) Coverage includes nomenclature, structure, properties, and the synthesis, reactions, and reaction mechanisms of organometallics, alcohols, aldehydes, ketones, amines, carboxylic acids, and carboxylic acid derivatives. Spectroscopy is covered. Reactions covered include redox reactions; Grignard and organometallic reactions; cationic and anionic addition, elimination, and substitution reactions; Wittig reactions; aldol, Claisen and other enolate reactions; and hydrolysis reactions among others. Reaction mechanisms are emphasized. Product prediction, synthesis design, and retrosynthesis skills are emphasized. Structure, stability, relative reactivity, and acid-base chemistry are included.

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 no 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 ACHIEVE/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. ACHIEVE/Sapling online homework problems; 5. "Quizzes" (open notes, take-home); and 6. Textbook practice problems. Of these the ACHIEVE/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 ACHIEVE/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. ACHIEVE/Sapling online homework problems; and 5. Book practice problems.

Graded Assessment (Required Work): 1. ACHIEVE/Sapling online homework 2. Quizzes. 3. Tests.
The test scores will make up >80% of the class points. ACHIEVE/Sapling and the quizzes will combine for the other >15%.

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. **Nomenclature**. Provide correct IUPAC names for alcohols, aldehydes, ketones, amines, carboxylic acids, and esters.
2. **Predict and explain Patterns and Properties**. Predict and explain patterns in structure, hybridization, acidity, basicity, solubility, and reactivity for alcohols, aldehydes, ketones, amines, carboxylic acids, acid chlorides, anhydrides, esters, and amides by understanding and applying concepts of organic structure and bonding and stability.
3. **Acid-Base**: Predict, rank, and apply acidities of carboxylic acids, phenols, water, alcohols, ketones, esters, 1,3-dicarbonyls, and ammoniums, and predict, rank, and apply basicities of their conjugate bases, relative to other acids and bases. Apply the impact of electron donors or withdrawers, and the impact of lone-pair hybridization.
4. **NMR:** Demonstrate understanding of fundamental 1D Nuclear Magnetic Resonance spectroscopy. This will include being able to solve for chemical structure given an H-NMR or C-NMR spectrum and a molecular formula; being able to predict 1H-NMR chemical shifts, splitting and integration; being able to predict C-NMR chemical shifts; being able to diagnose NMR equivalence and non-equivalence; being able to demonstrate fluency in the terminology of NMR; and being able to use Infrared Spectroscopy to identify characteristic functional groups.
5. **Predict reaction products**. Be able to predict products in the reactions of alcohols, aldehydes, ketones, amines, carboxylic acids, acid chlorides, anhydrides, esters, and amides.
6. **Synthesis Reactions**: Demonstrate understanding of reactions and reaction pathways involved in the synthesis of alcohols, aldehydes, ketones, amines, carboxylic acids, acid chlorides, anhydrides, esters, and amides.
7. **Draw Mechanisms.** Draw logical and detailed mechanisms for various fundamental reactions involving alcohols, aldehydes, ketones, amines, carboxylic acids, acid chlorides, anhydrides, esters, and amides.
8. **Synthesis Design**: Given a starting chemical, suggest reactants or sequences of reactions/reactants that could transform the starting material into a target product.
9. **Retrosynthetic analysis and Synthesis Design**. Use retrosynthetic analysis to design efficient one-step or multistep syntheses involving alcohols, aldehydes, ketones, amines, carboxylic acids, acid chlorides, anhydrides, esters, or amides as starting materials, intermediates or final products
10. **Classify, explain, and apply fundamental reactions.** Be able to recognize, classify, explain, and apply fundamental organic reactions such as oxidation reactions; reduction reactions; Grignard reactions; anionic additions; acid-catalyzed additions, eliminations, and substitutions; enolate reactions; hydrolysis reactions; and interconversions between carboxylic acids, acid chlorides, anhydrides, esters, and amides.
11. **Demonstrate Understanding in Miscellaneous Scenarios Involving Alcohols, Aldehydes, Ketones, Amines, Carboxylic Acids, Acid Chlorides, Anhydrides, Esters, and Amides.** Answer questions and explain/predict/apply physical properties, nomenclature, synthesis, reactions, mechanisms, and synthesis design/retrosynthesis to scenarios involving alcohols, aldehydes, ketones, amines, carboxylic acids, acid chlorides, anhydrides, esters, and amides.

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 ACHIEVE/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 prpare 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. ACHIEVE/Sapling online homework problems; 5. "Quizzes" (open notes, take-home); and 6. Textbook practice problems. Of these the ACHIEVE/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 ACHIEVE/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. ACHIEVE/Sapling online problems; and 5. Book practice problems.

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

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

TEST ONE SKILLS/OBJECTIVES / OUTCOMES / COMPETENCIES

- The following list specifies **major** skills/competencies that you may be asked to demonstrate on tests.
- The list should not be viewed as exhaustive; anything that is addressed in the notes and is not designated either in the notes or in the lectures as "not test responsible" should be considered to be fair game for test assessment.

Ch		TEST ONE. ALCOHOL CHEMISTRY	Self-Assessment (Some but not all Graded)	Graded Assessment
10	Structure and Synthesis of Alcohols	1. Nomenclature: Draw and name alcohols, phenols, and diols, including alkenols and cyclic alcohols; or given a name, be able to draw the structure. 2. Physical Properties: Predict and rank relative boiling points and solubilities of alcohols relative to other organic structures. 3. Predict products or specify reactants involved in the conversion of alkenes, alkyl halides, or carbonyl compounds to alcohols; and be prepared to use these transformations in multi-step synthesis scenarios, whether that be product prediction or synthesis design or retrosynthesis. 4. Grignard Reactions: Draw the expected products when organomagnesium reagents (Grignard reagents) react with aldehydes, ketones, esters (including cyclic esters), formaldehyde, or epoxides. 5. Organometallic compatibility: Identify which solvents are appropriate for use when preparing and using RMgBr reagents; identify which haloalkanes could be effectively converted to RMgBr reagents and subsequently reacted intermolecularly with other carbonyls. 6. Rank the relative reactivities of aldehydes, ketones, esters, alcohols, or water towards strong nucleophiles/bases such as RMgBr reagents. 7. Mechanisms: Use arrow-pushing to display electron movement in chemical reactions involving RMgBr, LiAlH4, or NaBH4 and aldehydes, ketones, esters (including cyclic esters), or epoxides. 8. Synthesis Design: Given a starting chemical, suggest reactants or sequences of reactions/reactants that could transform the reactant into a target product. (Presumably involving an alcohol as reactant, intermediate, or final product.) 9. Retrosynthesis: Identify different combinations of chemicals that could be used to synthesize 1º, 2º, or 3º alcohols or derivatives thereof. 10. Hydride Reduction Reactions: Predict products for reactions involving sodium borohydride or lithium aluminum hydride, including selective or non-selective reductions involving more than one carbonyl. Also be able to identify an appropriate hydride reducing agent for a particular reduction reaction.	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. ACHIEVE/Sapling homework problems 5. Book practice problems	1. ACHIEVE homework 2. Quiz 1 3. Test 1
11	Reactions of Alcohols	11. Acid-Base: Predict and rank acidities and basicities of alcohols and alkoxides relative to other organic structures; and predict when acid/base reactions will or won't be product favored 12. Extraction: Identify and explain which chemicals will be extracted from an organic solvent into neutral water or into NaOH/water 13. Predict the products (multi-reactions sequences may be involved) for reactions sequences involving alcohols and • Reducing metals such as elemental Na or K • Bases • Oxiding agents such as PCC and H2CrO4 • Dehydrating agents such as H2SO4 or H3PO4 • Halogenating agents such as HBr, PBr3, HCl, HI, and SOCl2 (including stereochemistry) • Sulfonating agents such as TsCl and subsequent reactions 14. Chemical Tests: Identify possible structures for a chemical given a chemical formula and chemical test results (Jones, Lucas, H_2/Pt reaction…) 15. Mechanisms: Draw mechanisms for ROH → RX reactions, using HBr (or HCl or HI) or PBr3. 16. Synthesis Design: Given a starting chemical, suggest reactants or sequences of reactions/reactants that could transform the reactant into a target product. (Presumably involving an alcohol as reactant, intermediate, or final product.) 17. Retrosynthesis: Design syntheses involving different combinations of chemicals that could be used to synthesize 1º, 2º, or 3º alcohols or derivatives thereof. A limited array of possible starting chemicals will be allowed.	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. ACHIEVE/Sapling homework problems 5. Book practice problems	1. ACHIEVE homework 2. Test 1

TEST TWO SKILLS/OBJECTIVES / OUTCOMES / COMPETENCIES

- The following list specifies **major** skills/competencies that you may be asked to demonstrate on tests.
- The list should not be viewed as exhaustive; anything that is addressed in the notes and is not designated either in the notes or in the lectures as "not test responsible" should be considered to be fair game for test assessment.

Ch		**TEST TWO Nuclear Magnetic Resonance Spectroscopy and Infrared**	**Self-Assessment** (Some but not all Graded)	**Graded Assessment**
13	Nuclear Magnetic Resonance Spectroscopy	1. Given a structure, determine which protons or which carbons are equivalent and which are nonequivalent 2. Given a structure, predict the approximate chemicals shifts for the hydrogens or the carbons 3. Use integrals to determine the relative numbers of different types of protons. 4. Use proton spin-spin splitting patterns, combined with integration and chemicals shifts, to determine the structure of alkyl and other groups and to track as far as possible from one end of a molecule. 5. Given a chemical structure, predict the approximate integration, chemical shift, and splitting for each hydrogen signal set. 6. Given a chemical structure, predict the approximate chemical shift for the carbons, and perhaps the splitting that would occur were a carbon NMR to be acquired. 7. Use integration, splitting, and chemical shifts to recognize and identify common groups, for example hydroxyl; methyl, ethyl, isopropyl, propyl; methoxy, ethoxy, isopropoxy, propoxy; methyl carbonyl, ethyl carbonyl, isopropyl carbonyl, propyl carbonyl; monosubstituted benzene, and disubstituted benzene. Given a chemical formula and an H-NMR, use the integration, chemical shifts, and splitting to solve for the structure of the chemical. 8. Distinguish overlapping signals from "clean" signal sets in an H-NMR. 9. Demonstrate and apply common terminology, such as "upfield" and "downfield"; "shielding" versus "deshielding"; and "methylene" and "methine" as well as methyl. 10. Demonstrate an understanding of the additive impact of functional groups on systems that have multiple functional groups. 11. Given a formula and a C-NMR, solve for a plausible structure of the chemical. 12. Given a formula, use whatever combination of H-NMR, C-NMR, and infrared data that is provided to solve for the structure of the chemical.	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. ACHIEVE/Sapling homework problems 5. Book practice problems	ACHIEVE/Sapling homework Test 2
12	Infrared Spectroscopy	13. Given an IR spectrum or summary, identify characteristic peaks, particularly for OH and carbonyl groups 14. Distinguish whether a carbonyl is present, including whether it is saturated or unsaturated. 15. Distinguish whether an alcohol hydroxyl group is present.. 16. Given formulas with one or two oxygens present, identify which functional groups are present (such as ester; alcohol; carboxylic acid; hydroxyl ketone; ether; and saturated versus unsaturated carbonyl). 17. Match characteristic peaks with actual molecules. 18. Use IR in combination with H-NMR to solve for the structures of chemicals.	1. In-lecture in-notes problems 2. Practice sets online 3. Practice Tests 4. ACHIEVE/Sapling homework problems 5. Book practice problems	ACHIEVE/Sapling homework Test 2

TEST THREE SKILLS/OBJECTIVES / OUTCOMES / COMPETENCIES

- The list should not be viewed as exhaustive; anything that is addressed in the notes and is not designated either in the notes or in the lectures as "not test responsible" should be considered to be fair game for test assessment.

		TEST THREE: Aldehydes, Ketones, and Enolate Chemistry	**Self-Assessment**	**Graded Assessment**
18	Ketones and Aldehydes	1. Nomenclature: Draw and name aldehydes and ketones, including in the context of multifunctional molecules where decisions about which groups are treated as substituents are necessary; or, given a name, be able to draw the structure. 2. Physical Properties: Predict and rank relative boiling points and solubilities of carbonyl compounds relative to other organic structures. 3. Carbonyl Synthesis: Process reactions for synthesis of ketones or aldehydes from alcohols, alkenes, alkynes, carboxylic acids, nitriles, acid chlorides, or aromatic compounds. This could involve predicting a product, specifying a starting material, designating an appropriate reactant, or proposing an effective synthesis. Single-step or multistep reactions may be involved. 4. Carbonyl Reactions: Predict the products for reactions (including multi-step reactions) of ketones and aldehydes with the following types of compounds: a. Hydride reducing agents (NaBH4, LiAlH4) b. Organomagnesium reagents (Grignard reagents) c. HCN d. Water under acid or base conditions (reversible hydrate formation) e. Alcohols (reversible hemiactal and acetal formation, including cyclic hemiacetals and acetals; and the reverse reactions involving acetal hydrolysis) f. Amines (reversible aminol and imine formation, including cyclic aminols and imines, and the reverse reaction involving imine hydrolysis) 5. Mechanisms: Be able to draw mechanisms for carbonyl reactions listed above, including the reverse reaction, including those involving rings. Major mechanisms include addition (anionic or acid-catalyzed), elimination, and substitution reactions. 6. Demonstrate/apply understanding of whether a mechanism is anionic or cationic. 7. Rank the relative reactivities of aldehydes, ketones, and esters. 8. Demonstrate understanding/application of protection and deprotection procedures. 9. Chemical Tests: Identify structure based on tests (including DNP and Tollens Tests) 10. Draw the starting materials that would react to produce a given product. 11. Synthesis Design: Given a starting chemical, suggest reactants or sequences of reactions/reactants that could transform the starting material into a target product. 12. Retrosynthesis: Design syntheses of targets, given a restricted pool of allowed starting materials. (Presumably involving carbonyls.)	1. In-lecture problems 2. Practice sets online 3. Practice Tests 4. ACHIEVE homework problems 5. Book practice problems	ACHIEVE homework Quiz Test 3
22	Alpha Substitutions and Condensations of Enols and Enolate	13. Acid-Base: Predict and rank acidities and basicities of ketones, esters and 1,3-dicarbonyl compounds relative to other acids and bases; predict when acid/base reactions will or won't be product favored; apply understanding of equilibria. 14. Predict when bases (hydroxide, alkoxide, versus LDA) will afford "complete" versus "small equilibrium" versus zero population of enolate anion 15. Predict the products (multi-reactions sequences may be involved) when enolate anions react with the following electrophiles: • Proton (racemization, reversible enol formation) • Halogen (including polyhalogenatin) • Alkyl halides (including usage of LDA as base) • Aldehydes/ketones (aldol reaction resulting in beta-hydroxy carbonyls; aldol condensations resulting in enones; including intramolecular versions) • Esters (Claisen reactions, including intramolecular versions) 16. Mechanisms: Draw mechanisms for each of the above reactions 17. Predict the product for reactions (including multistep reactions) involving carbonyls and phosophorus ylides (Wittig reaction) 18. Process reactions involving 1,3-dicarbonyls, including ester hydrolysis and thermal decarboxylation of 1,3-carbonyl acids. 19. Process keto-enol equilibration and mechanism, and rank amounts of enol. 20. Chemical Tests: Identify possible structures for a chemical given a chemical formula and chemical test results (including Iodoform, DNP and Tollens Tests) 21. Draw the starting materials that would react to produce a given product. 22. Synthesis Design: Given a starting chemical, suggest reactants or sequences of reactions/reactants that could transform the starting material into a target product. (Presumably either involving enolate chemistry. Synthesis of alkenes via aldol condensation or Wittig reaction will also be a priority skill.) 23. Retrosynthesis: Design syntheses of targets, given a restricted pool of allowed starting materials.	1. In-lecture problems 2. Practice sets online 3. Practice Tests 4. ACHIEVE homework problems 5. Book practice problems	ACHIEVE homework Test 3

TEST FOUR SKILLS/OBJECTIVES / OUTCOMES / COMPETENCIES

- The list should not be viewed as exhaustive; anything that is addressed in the notes and is not designated either in the notes or in the lectures as "not test responsible" should be considered to be fair game for test assessment.

		TEST FOUR	**Self-Assessment**	**Graded Assessment**
19	Amines	1. Nomenclature: Name amines, and draw structures given names. 2. Physical Properties: Predict and rank relative boiling points and solubilities of amines compounds relative to other organic structures. 3. Contrast physical properties of amines with those of ammonium salts. 4. Acid-Base: Predict and rank basicities of amines and acidity of ammoniums relative to other bases and acids. 5. Determine nitrogen atom hybridization and lone-pair hybridizaton; and apply to amine basicity and ammonium acidity. 6. Amine Reactions: Predict the products or identify starting materials for for reactions (including multi-step reactions) of amines, including with proton donors (acid-base); carbonys (imine formation); alkyl halides (alkylation and polyalkylation); acid chlorides (amide formation); carboxylic acids (acylation, amide formation); and carbonyl in the presence of H+/NaBH3CN (reductive amination). 7. Amine Synthesis: Demonstrate understanding of amine synthesis. This could involve predicting a product, specifying a starting material, designating an appropriate reactant, or proposing an effective synthesis. Major amine precursors include carbonyls (reductive amination; 1º, 2º, or 3º amines possible); amides (1º, 2º, or 3º amines); nitro compounds (1º); alkyl halides and ammonia (1º), and nitriles (1º). 8. Mechanisms: Be able to draw mechanisms for reactions including acid-base reactions; alkylation; polyalkylation; and acylation. 9. Draw the starting materials that would react to produce a given product. 10. Synthesis Design: Given a starting chemical, suggest reactants or sequences of reactions/reactants that could transform the starting material into a target product. 11. Retrosynthesis: Design syntheses of targets, given a restricted pool of allowed starting materials.	1. In-lecture problems 2. Practice sets online 3. Practice Tests 4. ACHIEVE/Sapling homework problems 5. Book practice problems	ACHIEVE/ homework Test 4
20, 21	Carboxylic Acids and Carboxylic Acid Derivatives	12. Nomenclature: Name carboxylic acids, esters, and carboxylates; and draw structures given names. 13. Physical Properties: Predict and rank relative boiling points and solubilities of carboxylic acids relative to other organic structures. 14. Acid-Base: Predict and rank acidity of carboxylic acids and basicity of carboxylates relative to other bases and acids. 15. Diagnose how electron donors or withdrawers impact acidity/basicity. 16. Determine which version of an amino acid monomer exists at different pH's 17. Carboxylic Acid Synthesis: Use chemical equations to demonstrate understanding of carboxylic acid synthesis reactions, including: hydrolysis of acid chlorides, anhydrides, esters, or amides under neutral, acidic, or basic conditions; oxidation of alcohol, alkene, or alkyl benzenes; carboxylation of Grignard reagents; hydrolysis of nitriles; or hydrolysis/decarboxylation of 1,3-diesters. 18. Carboxylic Acid Reactions: Use chemical equations to demonstrate understanding of carboxylic acid reactions, including direct or indirect conversion to acid chlorides; anhydrides; esters; amides. 19. Interconversions among Carboxylic Acids and Derivatives: Use chemical equations to predict products, identify starting materials, and design pathways for interconversions between carboxylic acids, acid chlorides; anhydrides; esters; amides, and carboxylates. 20. Mechanisms: Be able to draw mechanisms for interconversions between carboxylic acids, acid chlorides; anhydrides; esters; amides, and carboxylates, including "downhill" reactions and acid-catalyzed "lateral" conversions within the ClAvENO series. 21. Draw the starting materials that would react to produce a given product. 22. Synthesis Design: Given a starting chemical, suggest reactants or sequences of reactions/reactants that could transform the starting material into a target product. 23. Retrosynthesis: Design syntheses of targets, given a restricted pool of allowed starting materials.	1. In-lecture problems 2. Practice sets online 3. Practice Tests 4. ACHIEVE/Sapling homework problems 5. Book practice problems	Test 4

Safety & Procedural Information

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, Title IX Coordinator, petrsnly@mnstate.edu; 218-477-2967, or Ashley Atteberry, Director of Student Conduct & Resolution, ashley.atteberry@mnstate.edu 218-477-2174; both located in Flora Frick 153. Additional information is available online mnstate.edu/titleix.

Bias Incident Statement: A bias incident is an act of bigotry, harassment, or intimidation that is motivated in whole or in part by bias based on an individual's or group's actual or perceived race, color, creed, religion, national origin, sex, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, or familial status. If you are a student who has experienced or witnessed a hate or bias incident, we want to address the incident and provide you with resources. Contact the Campus Diversity Officer, Jered Pigeon (jered.pigeon@mnstate.edu, 218-477-2047, 114 CMU) or the Dean of Students, Kara Gravley-Stack (kara.gravleystack@mnstate.edu, 218-477-4222, 153 Flora Frick Hall). Additional information is available at: https://www2.mnstate.edu/oscar/.

Student Grievance/Complaint Process: This general procedure is applicable only to those administrative actions for which no special grievance procedure has been established. Special procedures have been established for certain academic (e.g., graduation, grades), student conduct, discrimination/harassment, and employment related matters. Students desiring to appeal actions or procedures of University administrative offices must meet with the following officials, continuing up the hierarchy as necessary to resolve the issues.

Academic Affairs

1. Department Chair of the academic discipline in which the problem arose
2. Dean of that college discipline
3. Provost and Senior Vice President for Academic Affairs
4. President

Administrative Affairs

1. Director of specific area
2. Vice President for Administrative Affairs
3. President

Student Affairs

1. Director of specific area
2. Vice President for Student Affairs
3. President

This process can also be found in the Policies and Procedures section of the Student Handbook (p. 12) (mnstate.edu/student-handbook/).

Building Emergency Plans: Whether taking your courses online, hybrid, Hyflex, or face-to-face, you may find yourself on campus at some point, so best to be prepared and aware. Building floor plans showing emergency exit routes, fire extinguisher locations and fire alarm pull stations are conspicuously located in classrooms, labs, conference rooms, departmental main offices and residence halls. The Emergency Preparedness Guides (flip style booklets) are located with the maps. Please review the floor plans as well as the guide so you know how to respond in an emergency to help protect yourself and others. If you have questions, please contact Ryan Nelson, Director of Public Safety, at ryan.neslon@mnstate.edu or 218-477-5869. (mnstate.edu/public-safety/).