Chemistry 112A Organic Chemistry, Section 2 (Straus)
Fall 2016

Contact Information:

Instructor: Daniel A. Straus
Office Location: Science 141
Telephone: (408)924-4998
Email: daniel.straus@sjsu.edu
Office Hours: Monday 2:30-3:30 PM; Tuesday 2:30-4:00 PM
Class Days/Time: Lecture MW 4:30-5:45 PM
Classroom: Duncan Hall 250
Prerequisites: CHEM 1B (with a grade of "C" or better; "C-" not accepted). Chem 1B may not be taken concurrently with Chem 112A.

Faculty Web Page and MYSJSU Messaging
Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the Canvas page for this course. I will also use the email address listed on your mySJSU account regularly to send information on Chem 112A - make sure your email is current. You are responsible for checking for messages on this email on a regular basis to learn of any updates. Many important files will be posted to Canvas, so be sure you check it frequently. If you are unable to access Canvas, let me know and I will refer you to the Canvas help desk.

Course Description
Chemistry 112A is intended for students who are interested in a profession in science, engineering, forensics, and related fields. This one-year course sequence (along with Chemistry 112B) will introduce you to the concepts that will lead to a comprehensive understanding of organic chemistry. This course will stress an understanding of these concepts, as well as their applications. While some memorization of the course material will be required, you will also be expected to apply the underlying principles in the context of problem solving (most notably on exams). An emphasis will be placed on a thorough conceptual and mechanistic understanding of organic reactions. Note that all exams are cumulative for prior material, thus in lecture and exams it is important to recall information that was covered earlier. The final exam will be comprehensive for all material covered this semester. The Course and Program Learning Objectives below give a fairly comprehensive list of topics covered in Chem 112A.
Course Goals and Learning Objectives

- Appreciation for the nature and scope of organic chemistry.
- Application of key concepts from general chemistry including electronegativity, bonding (ionic and covalent), hybridization of atomic orbitals, and molecular orbital theory to organic systems.
- Draw valence bond and Lewis dot structures for organic species, including formal charges.
- Draw skeletal structures for organic compounds, show stereochemistry clearly.
- Apply acid-base concepts to organic systems; predict ordering of acid or base strength.
- Name alkanes, alkenes, polyenes, alkynes, alkyl halides, aromatic compounds and their various derivatives using systematic (IUPAC) nomenclature.
- Learn common names for some key chemicals.
- Use bond dissociation energies (BDE’s) to calculate reaction energetics.
- Determine oxidation states of organic chemicals.
- Draw reaction mechanisms for polar and radical processes.
- Recognize stereochemistry and be able to apply the Cahn-Ingold-Prelog system to designation of stereochemistry (E/Z or R/S).
- Apply stereochemistry to determination of reaction mechanism.
- Understand the fundamentals of reaction kinetics and be able to apply to the determination of reaction mechanism.
- Learn many of the reactions of alkanes, alkenes, polyenes, alkynes, aromatic compounds, and closely related species. Be able to both predict products and, in many cases, provide probable reaction mechanisms.
- Employ the reactions learned in designing multistep organic synthesis.
- Learn and be able to apply the material presented in Chapters 1-11 and 14-16 in the text (McMurry, 9th edition) as well as additional topics introduced in lecture.

Program Learning Outcome (PLO)

Chemistry 112A satisfies the following Program Learning Outcomes for the Chemistry Department:

#2 Demonstrate understanding of core concepts and to effectively solve problems in organic chemistry

Required* Texts/Readings

*McMurry, John. Organic Chemistry, 9th ed., Cengage - The SJSU Bookstore carries the custom SJSU edition bundled with OWL, the online reference tool; this is not a hardbound edition it is loose-leaf (more convenient - you don't need to carry the whole text around) and it will save you considerably from the complete version of the text (it is less than $125). You are welcome to obtain the hardcover 9th edition of McMurry from another bookseller, but I recommend that it come with access to OWL (I cannot arrange free access to OWL). Note the 9th edition of McMurry is the "official" version for 112A - I will be only using this edition for this course, not earlier editions.

*Obtain a pack of Scantron 2020 forms from the Bookstore (these will also be used in Chem 112B).

Optional: A set of molecular models for organic chemistry (a kit by Maruzen is sold by the SJSU Bookstore; other versions may be available from other sources).
Library Liaison
The Chemistry Library Liaison is Ann Agee (ann.agee@sjsu.edu)

Course Requirements and Assignments:

Catalog Description Chemistry of the carbon compounds, both aliphatic and aromatic, emphasizing underlying concepts. Prerequisite: CHEM 1B (with a grade of "C" or better; "C-" not accepted).

-> You must have completed Chem 1B with a grade of "C" or better; you may not take Chem 1B concurrently with Chem 112A! If you are found to not have completed the prerequisite, I may drop you from this course at any time during the semester.

The scheduled time for this course is MW 4:30 to 5:45 PM in DH-250.

Tentative Course Calendar:

A tentative schedule for the semester appears at the end of this document. It is likely that the dates on which specific topics are covered may change depending on the pace of the lectures. If so, this will affect the material covered on each exam. The only way to know what will be on an exam is to be present for all lectures. Note in particular the dates for the Hour Exams and the Final Exam, which are firm dates.

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Course Attendance Policy:

You are required to attend every class meeting of Chem 112A. DO NOT enroll in this class if work or other issues prevent you from attending every class meeting. Lectures will go over key points and supplement information from the textbook. Additionally, a significant amount of information is not from the textbook and will only be covered in lecture. In my experience, students who do not come to class regularly do poorly on exams and in this course. Please arrive in time for the 4:30 PM start of Chem 112A.

Dates for all exams are firm. Enter these dates on your calendars now. In particular, note the final exam date now (Fri, Dec 16, 2016 @ 1445-1700) - do not plan to be anywhere else on that date and time.

University policy F69-24: “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.”
**Grading Policy:**

Three "Hour" exams (each 60 min) will be given throughout the semester, each with a maximum score of 150 points. The Final exam will be worth a total of 200 points. You are required to take any two Hour Exams. If you take all 3 Hour Exams, the two highest scores will be used in the calculation of your grade. If you do not take one of the Hour exams, for any reason, this will be the score which will not be used in the grade calculation. The Hour exams will be will be given at the start of the lecture period. Plan to arrive on time when an exam is given, since all exams will be collected at the same time, no extra time is provided if you start late.

The Final exam will be comprehensive for all material covered in Chem 112A, and will be worth 200 points. The Final exam is required for everyone.

Your final grade will be based on:

- 300 points for two Hour exams (2 x 150 points) - 30% each hour exam
- 200 points for the Final (you can't drop the final) - 40% final exam

**TOTAL 500 points**

Grades will be assigned on a "+/-" system. The course grades will be assigned according the following ranges:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>100-96%</td>
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<tr>
<td>A</td>
<td>95-91%</td>
</tr>
<tr>
<td>A-</td>
<td>90-86%</td>
</tr>
<tr>
<td>B+</td>
<td>85-81%</td>
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<tr>
<td>B</td>
<td>80-76%</td>
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<tr>
<td>B-</td>
<td>75-71%</td>
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<tr>
<td>C+</td>
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<tr>
<td>C</td>
<td>65-61%</td>
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<tr>
<td>C-</td>
<td>60-56%</td>
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<tr>
<td>D+</td>
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<tr>
<td>D</td>
<td>50-46%</td>
</tr>
<tr>
<td>D-</td>
<td>45-41%</td>
</tr>
<tr>
<td>F</td>
<td>&lt;40%</td>
</tr>
</tbody>
</table>

You can use the scale above to estimate your grade. At the end of the semester, any modifications will be in your favor, but you should not expect significant changes. Note that the "class average" for a given exam is not necessarily a "C" grade. Grades are assigned by these grade ranges, not by "curves."

A good way to assess your preparation for the exams is to make use of sample exams from Fall 2014 that are available on Canvas. The fact that these exams are on a 100 point scale does not matter - the level of difficulty is similar.

Realize that your course grade is based on the aggregate of points from three exams, not from one exam only. Thus, even if you do poorly on one exam, you may improve your overall grade by doing well on other exams. In assigning grades, only one set of criteria is applied equally to all students in the class - everyone has the same opportunity as everyone else to earn their grade.

Note that "incomplete" grades will only be considered if you have an unexpected situation or emergency that prevents you from finishing the semester. It is required that you have completed most of the course work with a passing grade until that point. A typical situation is a medical emergency that prevents you from taking the final exam - to be considered you must provide documentation and a means to verify the emergency. Poor performance in the class or inability to keep up with the material is not an acceptable reason for an incomplete or to drop the class.
Exam Policies:
• A Scantron 2020 form will be required for the Hour exams and Final exam
• Roll will be taken during exams.
• IDs may be randomly checked so always bring a picture ID (SJSU ID or driver's license)
• Seats will be assigned at my discretion.
• Calculators, computers, cellphones, or any other electronic devices that can photograph, record, and/ or transmit images of any kind are NOT allowed at your desk during exams. These must be left in the front of the room. No notes or other sources of information are allowed. Anyone found violating this rule will receive, at minimum, an automatic score of "0 points" for the exam and this exam will be counted as one of the two hour exam scores (the second highest score will be dropped). Additional judicial sanctions will apply. See Academic Integrity section below for more details.

Other Class Policies:
• Audio Recording: audio (only) recording is allowed. Note I do not allow video recording. See also University Policies below.
• Cell Phones: Out of courtesy, turn off ringers and alarms during lectures and exams.
• Computers: You may use your laptop during class lectures only for taking notes or accessing electronic Chem 112A course material as long as they are not distracting (no playing video games or watching videos); computers are not allowed during exams.
• Exam Makeup and Regrade Policy:
You are required to take any two of the three Hour exams given. If an Hour exam is not taken for any reason, that exam will be the one exam score that is not used in grade calculation. A makeup will only be considered if you miss a second Hour exam due to an unforeseen emergency and provide a documented and verifiable reason. In all cases, you must contact me as soon as reasonably possible. Before any action will be taken, you will be required to provide a verifiable document describing your emergency with the doctor's name and phone number. Note this only applies if you miss a second hour exam.

Absence due to personal or work related issues is not a reason to miss an exam. See the course attendance policy.

Any request for a regrade or recalculation of any exam or quiz must be made within two weeks after the exam is returned in class (if you are not in class the day it is returned, it is your responsibility to obtain your exam from me). No regrades will be considered beyond this time. The exam must be left with me, and I will review the entire exam.

The Final Exam is not returned, but may be viewed in a subsequent semester during my office hours. Exams are locked away, so please make arrangements with me a few days in advance.

• Emergencies and Building Evacuations
If you hear a continuously sounding alarm, or are told to evacuate the building by an Emergency Coordinator, walk quickly to the nearest exit. Take your personal belongings as you may not be allowed to return. Follow the instructions of the Emergency Coordinators. Be quiet so you can hear instructions. Once outside, move away from the building. Do not return to the building unless the Police or the Emergency Coordinator announces that this is permissible.
University Policies

As a student at SJSU, you should review these University Policies that apply to ALL university courses.

http://www.sjsu.edu/gup/syllabusinfo/#GeneralExpectations

The topics include the following:

- General Expectations, Rights and Responsibilities of the Student
- Dropping and Adding
- Consent for Recording of Class and Public Sharing of Instructor Material
- Academic integrity
- Campus Policy in Compliance with the American Disabilities Act
- Student Technology Resources
- SJSU Peer Connections
- SJSU Writing Center
- SJSU Counseling and Psychological Services

In addition to the university policies above, I have additional policies that apply specifically to Chem 112A. Please note the following:

Consent for Recording of Class and Public Sharing of Instructor Material
Audio recording of lectures is allowed. I do not allow video recording of lectures. Much of the material I prepare for Canvas is prepared by me and is considered my personal property. It may not be shared with anyone who is not enrolled in Chem 112A.

Academic Integrity
Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person’s ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU’s Academic Integrity Policy S07-2 requires approval of instructors.

For Chem 112A, any form of cheating or unfair advantage will be dealt with seriously in this course, and will result in an appropriate penalty. At minimum, an infraction will result in "0" points for that exam and it will count as one of two Hour Exam Scores (meaning the second highest exam score will be dropped); a grade of "F" for the course may also be given. The SJSU "Policy on Academic Dishonesty" as described in detail in the SJSU Catalog will be the guideline for any action taken, and the case will be referred to the SJSU Office of Student Conduct and Ethical Development. The instructor or the SJSU Office of Student Conduct and
Ethical Development may apply more serious penalties. An infraction may also result in a student's name being placed in a Chemistry Department file and other sanctions.

**Campus Policy in Compliance with the American Disabilities Act**

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at [http://www.sjsu.edu/drc/](http://www.sjsu.edu/drc/) to establish a record of their disability.

Note that accommodations for exams should be made well in advance of an exam, since both I and the AEC need to make arrangements.

**Advice for Students Taking Chem 112A (FROM other students!):**

Over the years, I have asked students who have done well in Chem 112A and 112B what their "secrets" are - here are the most common responses:

- keep up with the course, don't ever fall behind
- attend every lecture and take copious notes (listen for hints)
- read the text before and after each lecture
- copy (by hand) your lecture notes soon after the class
- work problems immediately after they are discussed in class (there is no way to catch up if you try to do this just before the exam); do ALL of the problems in the book, problem sets on Canvas, and problems given in class.
- ACTUALLY write out the solutions before looking at the Study Guide,
- --do not memorize answers to specific problems; you need to understand how to determine the answer from principles since questions can be posed in different ways (you need to be able to answer questions that look different from ones in problem sets).
- DO NOT wait until just before the exam to start learning the material!

The common theme to these tips is that they all require you to take responsibility and keep up with Chem 112A in a timely and consistent manner. You will likely hear much griping about how "difficult" O-chem is, but you typically don't hear from the students who follow the advice above and do well in the class. I can't promise success for everyone, but you will very likely do much better if you follow all of these tips listed.

Throughout the semester I will post problem sets and other useful information on the Chem 112A Canvas site (see "Files") - check this site regularly.
Office Hours:

The University requires me to post 2 hours of office a week, but I regularly schedule at least 3 hours/week. My office hours are times dedicated to assist you and students in all of my courses. They are usually quiet except immediately before exams, so if you have questions, see me well before an exam when my office is relatively open. Many students show up in office just before each exam - during these times I can only handle a limited number of questions.

The faculty-to-student ratio for Chem 112A is very high for an upper division organic chemistry course. To maximize the number of student questions, all office hours will be "group" sessions. During office hours, enter my office even if other students are already present (if space allows) - don't wait in the hallway. If a student has a private matter, I will handle this individually. Please also realize that office hours are for all of the courses I teach, not only Chem 112A.

OTHER RESOURCES:

- COSAC (College of Science Student Advisory Center) has student tutors who are available for walk-in or scheduled assistance with questions - http://www.science.sjsu.edu/cosac/ NOTE: they get very busy just before our exams!

- Academic Workshops are primarily problem-solving sessions
- Peer Connections Resource Center  (http://peerconnections.sjsu.edu/)

All SJSU faculty have the ability to refer students who may need assistance in a specific course to Peer Connections, which has additional means of support besides tutoring. If you receive a message from Peer Connections, I recommend you follow up, as they may be able to assist you!
### CHEMISTRY 112A - ORGANIC CHEMISTRY (STRAUS)

**Fall 2016**

*Tentative Schedule (topics subject to change)*

Changes will be announced *only* in class.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading in Text (9th ed. McMurry)*</th>
<th>Recommended problems (but ALL problems are important!)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 24</td>
<td>Review; Structure and Bonding</td>
<td>1.1-1.7</td>
<td>1.1-19; 22-31; 33-38; 40; 47; 49-51; 53-56</td>
</tr>
<tr>
<td>Aug 29</td>
<td>Structure and Bonding; Orbitals</td>
<td>1.8-1.12</td>
<td></td>
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<tr>
<td>Aug 31</td>
<td>Polar Covalent Bonds; Formal Charges and Resonance</td>
<td>2.1-2.6</td>
<td>2.1-3; 5-15; 17; 19; 20; 24-26; 28-30; 32-41; 43-48; 52; 55-58; 60; 61</td>
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<td>Sept 7</td>
<td>Polar Covalent Bonds; Acids and Bases</td>
<td>2.7-2.12</td>
<td></td>
</tr>
<tr>
<td>Sept 12</td>
<td>Alkanes &amp; Their Stereochemistry; Functional Groups and Nomenclature</td>
<td>3.1-3.4</td>
<td>3.1-25; 27-40; 42; 46; 48; 50; 51; 53</td>
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<td>Sept 14</td>
<td>Alkanes &amp; Their Stereochemistry; Conformations</td>
<td>3.5-3.7</td>
<td></td>
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<tr>
<td>Sept 19</td>
<td>Cycloalkanes &amp; Their Stereochemistry</td>
<td>4.1-4.5</td>
<td>4.1-7; 12-16; 18; 19; 22; 23; 27-30; 34-39; 41; 42; 45-49; 53; 57; 59; 62</td>
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<td>Sept 21</td>
<td>Cycloalkanes &amp; Their Stereochemistry</td>
<td>4.6-4.9</td>
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<tr>
<td>Sept 26</td>
<td>Stereochemistry</td>
<td>5.1-5.5</td>
<td>5.1-5; 7-14; 21; 23; 24; 28; 31; 32; 35; 36-49; 57; 62-64; 67-69; 73-76</td>
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<tr>
<td>Sept 28</td>
<td><strong>Hour Exam One</strong></td>
<td>Chapters 1, 2, 3, &amp; 4</td>
<td></td>
</tr>
<tr>
<td>Oct 3</td>
<td>Stereochemistry</td>
<td>5.6-5.11</td>
<td></td>
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<tr>
<td>Oct 5</td>
<td>Overview of Organic Reactions</td>
<td>6.1-6.5</td>
<td>6.1-4; 7-12; 14; 15; 17; 19-21; 23; 24; 26-31; 33-38; 49</td>
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<tr>
<td>Oct 10</td>
<td>Overview of Organic Reactions; Alkenes - Structure and Reactivity</td>
<td>6.6-6.10</td>
<td>7.1-18; 26-31; 34-40; 42-48; 54-60; 61; 63; 66-68; 71</td>
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<tr>
<td>Oct 12</td>
<td>Alkenes - Structure and Reactivity</td>
<td>7.7-7.11</td>
<td>8.1-17; 20; 21; 26; 28; 30; 32; 33; 38; 40; 42a,b,c,e,f; 43-47; 49-55; 58-66; 68; 71</td>
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<td>Oct 17</td>
<td>Alkenes - Reactions &amp; Synthesis</td>
<td>8.7-8.13</td>
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<td>Oct 19</td>
<td>Alkenes - Reactions &amp; Synthesis (review)</td>
<td>9.1-9.3</td>
<td>9.1-6; 8-13; 19; 21; 24-28; 30-43; 45-50; 54; 57</td>
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<td>Oct 24</td>
<td><strong>Hour Exam Two</strong></td>
<td>Chapters 5, 6, 7, &amp; 8</td>
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<tr>
<td>Oct 26</td>
<td>Alkenes &amp; Organic Synthesis</td>
<td>9.4-9.9</td>
<td>10.1-3; 5-13; 17; 20-27; 29; 35-38; 41-44; 49</td>
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<td>Oct 31</td>
<td>Alkenes &amp; Organic Synthesis Organohalides</td>
<td>10.1-10.3</td>
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<td>Nov 2</td>
<td>Organohalides</td>
<td>10.4-10.10</td>
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<td>Date</td>
<td>Topic</td>
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<tr>
<td>Nov 7</td>
<td>Nucleophilic Substitutions &amp; Eliminations</td>
<td>11.1-11.5 (skim 11.6)</td>
<td>11.1-8; 10-13; 15-17; 19-21; 25-28; 31; 32; 34; 36; 38-41; 43-45; 47; 48; 50-52; 54-57; 59-67; 70; 72; 74-76</td>
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<td>Nov 9</td>
<td>Nucleophilic Substitutions &amp; Eliminations</td>
<td>11.7-11.10 &amp; 11.12 (skim 11.11)</td>
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<tr>
<td>Nov 14</td>
<td>Conjugated Dienes</td>
<td>14.1-14.6</td>
<td>14.1-3; 5-9; 20; 21; 31; 32; 40; 51; 54</td>
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<tr>
<td>Nov 16</td>
<td>Conjugated Dienes Introduction to Aromaticity</td>
<td>15.1-15.3</td>
<td>15.1-9; 11; 12; 18-22; 25; 26; 30-33; 35-37;</td>
</tr>
<tr>
<td>Nov 21</td>
<td>Hour Exam Three**</td>
<td>Chapters 9, 10, 11, &amp; 14</td>
<td></td>
</tr>
<tr>
<td>Nov 24</td>
<td>Thanksgiving</td>
<td>No Class -- <em>Bon Appetit!</em></td>
<td></td>
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<tr>
<td>Nov 28</td>
<td>Benzene and Aromaticity</td>
<td>15.4-15.6</td>
<td></td>
</tr>
<tr>
<td>Nov 30</td>
<td>Chemistry of Benzene</td>
<td>16.1-16.4</td>
<td>16.1; 3-9; 12-14; 16; 18-23; 28-30; 33; 34; 36; 37; 39; 40; 42; 46-49; 51-58; 67; 69; 70; 74</td>
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<td>Dec 5</td>
<td>Chemistry of Benzene</td>
<td>16.4-16.7</td>
<td></td>
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<td>Dec 7</td>
<td>Chemistry of Benzene</td>
<td>16.8-16.10</td>
<td></td>
</tr>
<tr>
<td>Dec 12</td>
<td>Review for Final Examination</td>
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**December 16 (Fri), 2016  FINAL EXAM 1445-1700**

Readings and problems for this course are based on the 9th edition of McMurry. If you choose to use an earlier edition, you are responsible for any differences from the 9th edition. *In addition, material not found in McMurry will be included in the lectures.*

*It is highly likely coverage of topics may change, depending on the pace of lectures. Any changes from the schedule will only be announced in class. Note attendance is mandatory for every lecture.*

**Unless there is a serious calamity, ALL EXAM DATES ARE FIRM. Mark these dates and times on your calendars NOW!**