Instructor Information:

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Phone: 541-737-6756
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All course information, updates, and announcements are posted via Canvas at:
https://oregonstate.instructure.com/

Office Hours: TBA

In accord with university policy email inquiries must be sent from your ONID email address.

Prerequisites:

CH 331 [C- or better] and one year of general chemistry.

Meeting Information:

<table>
<thead>
<tr>
<th>Lecture Days:</th>
<th>Monday, Wednesday, and Friday</th>
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</thead>
<tbody>
<tr>
<td>Lecture Times and Location:</td>
<td>TBA</td>
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<tr>
<td>First and Last Days of Term:</td>
<td>TBA</td>
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<tr>
<td>Midterm Exam:</td>
<td>TBA</td>
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<tr>
<td>Final Exam:</td>
<td>TBA</td>
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Resources and Materials:


Organic Molecular Modeling Kit (any number of acceptable kits will suffice)


Tentative Course Outline: *(Chapters below are listed in order of lecture presentation.)*

*Chapter 11*  Reactions of Alcohols, Ethers, Epoxides, Amines, and Sulfur-Containing Compounds

*Chapter 12*  Organometallic Compounds

*Chapter 14*  Infrared Spectroscopy

*Chapter 15*  NMR Spectroscopy

*Chapter 8*  Aromatic, Antiaromatic, and Nonaromatic Compounds

*Chapter 19*  Reactions of Benzene and Substituted Benzenes

*Chapter 16*  Carbonyl Compounds I
Midterm Examination:

The midterm exam (on TBA) will be administered outside of class. This exam will contain problems similar to those discussed in lecture, the ones assigned from the Canvas quizzes, and the ones assigned from the course textbook. This exam is 80 minutes long. Because exams are promptly marked and returned to the students, no make-up exams can be administered. A missed exam will receive a score of zero. If the university closes (due to inclement weather or for some other unforeseeable reason), the midterm exam will be rescheduled for the following Thursday evening (Week 6), starting at the same time (1900).

Final Examination:

The final exam will be administered on TBA. Please be on time. A late student may disturb the other students. The final exam is comprehensive. A missed final exam will receive a score of zero.

Exam Supplies:

1. Several number two pencils and a good eraser.
2. Molecular model kit; however, the kit must be unassembled prior to the start of the exam.
3. One 3” x 5” card with handwritten or typed notes on one side for the midterm exam and both sides for the final.

You must bring your OSU identification card to the exam and present it to the proctor upon completion of the exam. If you bring notes, papers, or books to the exam, place them in a sealed pack and place the pack at the front of the classroom. All audio devices, including CD/MP3 players and mobile telephones, must be turned off and put away during the exam.

Policy on Missed Exams:

A make-up midterm exam will not be given during the winter offering of CH 332.

Midterm Exam: 100 pts
Final Exam: 150 pts
Total: 250 pts

If a student misses the midterm exam due to illness, the final will count for 250 pts. The following scheme will be used:

Final Exam: 250 pts
Total: 250 pts
A missed final will receive a score of zero, unless an unforeseeable circumstance arises, such as a death in one's family or due to a serious illness. An incomplete may be granted at the discretion of the instructor. The final would need to be taken during the 2017 winter offering of CH 332.

**Evaluation:**

<table>
<thead>
<tr>
<th></th>
<th>Maximum Points</th>
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<tbody>
<tr>
<td>Midterm Examination</td>
<td>100</td>
</tr>
<tr>
<td>Final Examination</td>
<td>150 (or 250)*</td>
</tr>
<tr>
<td>Blackboard Quizzes</td>
<td>60</td>
</tr>
<tr>
<td><strong>Final Score</strong></td>
<td>310</td>
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</tbody>
</table>

*If the % grade of your final exam is higher than the % grade of your midterm exam, then your final exam % grade will be used to replace your midterm exam grade (as a %).

**Course grades are based on your overall score according to the following:**

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Minimum Score Needed out of 310</th>
<th>Corresponding Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>285</td>
<td>92%</td>
</tr>
<tr>
<td>A–</td>
<td>279</td>
<td>90%</td>
</tr>
<tr>
<td>B+</td>
<td>273</td>
<td>88%</td>
</tr>
<tr>
<td>B</td>
<td>254</td>
<td>82%</td>
</tr>
<tr>
<td>B–</td>
<td>248</td>
<td>80%</td>
</tr>
<tr>
<td>C+</td>
<td>242</td>
<td>78%</td>
</tr>
<tr>
<td>C</td>
<td>223</td>
<td>72%</td>
</tr>
<tr>
<td>C–</td>
<td>217</td>
<td>70%</td>
</tr>
<tr>
<td>D+</td>
<td>211</td>
<td>68%</td>
</tr>
<tr>
<td>D</td>
<td>192</td>
<td>62%</td>
</tr>
<tr>
<td>D–</td>
<td>186</td>
<td>60%</td>
</tr>
<tr>
<td>F</td>
<td>less than 186</td>
<td>&lt;60%</td>
</tr>
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</table>

This course is primarily based on lecture material. The textbook is provided as a learning resource and for practice problems. Students are expected to attend lectures and are responsible for all lecture material missed for any reason. **The instructor will not give “make-up lectures” during office hours.**
Homework:

Homework problems from the textbook can be found in the Lecture Schedule and Homework document under Modules in Canvas. These problems will not be graded or collected; however, they are absolutely essential to your success in the course!

Canvas Quizzes:

Six quizzes will be given throughout the term. These quizzes are open book and open note. You are encouraged to work with your fellow students to answer the questions. Students cannot ask the instructor or TAs questions about the quizzes while they are live. Questions about a particular quiz can only be asked after the appropriate key has posted to Canvas. Late quiz submissions will not be accepted. Complete the quiz early in the week as to avoid any last minute difficulties (i.e., technical or material comprehension). The quiz schedule is shown below:

<table>
<thead>
<tr>
<th>Quiz</th>
<th>Post Mon. at 10 AM</th>
<th>Due Fri. at 5 PM</th>
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<tbody>
<tr>
<td>1</td>
<td>TBA</td>
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<td>2</td>
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<tr>
<td>4</td>
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<td>5</td>
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<tr>
<td>6</td>
<td>TBA</td>
<td>TBA</td>
</tr>
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Recitations:

Recitations are 50-minute meetings that are led by a graduate teaching assistant (TA). Students are scheduled for one recitation per week and must attend the recitation section for which they are scheduled! Recitation sections are intended to provide the students with an opportunity to ask questions about the material and for the TAs to reinforce material covered during regular lectures.

Video Lecture Captures:

Video recordings of Dr. Myles’ lectures from a past term will be made available in the Modules folder on Canvas. Please note that comments pertaining to both deadlines and content on exams, might not apply to this current course offering of CH 332. If in doubt, please consult this syllabus for current and accurate information regarding deadlines and general course expectations.

Student Resources:

Your success in CH 332 is very important to me! You have the following resources to help you with your study:

1. Lecture and Recitation Meetings
2. Academic Success Center (http://success.oregonstate.edu/)
3. Textbook Readings
4. Instructor Office Hours
**Accommodations for Students with Disabilities:**

Accommodations are a collaborative effort between students, faculty, and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

**Academic Dishonesty:**

You will be expected to conduct yourself in a professional manner. Academic dishonesty such as plagiarism and cheating will not be tolerated. Therefore, students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

* cheating- use or attempted use of unauthorized materials, information or study aids,
* fabrication- falsification or invention of any information,
* assisting- helping another commit an act of academic dishonesty,
* tampering- altering or interfering with evaluation instruments and documents, or
* plagiarism- representing the words or ideas of another person as one's own.

For more information about academic integrity and the University's policies and procedures in this area, please refer to the Student Conduct website at:

http://oregonstate.edu/admin/stucon/achon.htm

**Student Learning Outcomes**

The successful student will be able to do the following:

**Nomenclature**

be able to give IUPAC names of alcohols, ethers, epoxides, aldehydes, ketones, carboxylic acids, esters and substituted benzenes ( mono-substituted, di-substituted)

**Alcohols and ethers**

given an alcohol substrate in conjunction with HX be able to predict the product(s), including stereochemical outcome of substitution (SN1/SN2), predict and explain the distribution of products and display mechanism via curved arrow formalism

given an alcohol substrate in conjunction with H2SO4 be able to predict the product(s), including stereochemical outcome of elimination (E1/E2), predict and explain the distribution of products and display mechanism via curved arrow formalism

given an alcohol substrate in conjunction with PX3 be able to predict the product(s), including stereochemical outcome of substitution (SN2), predict and explain the distribution of products and display mechanism via curved arrow formalism

given an alcohol substrate in conjunction with a sulfonyl chloride be able to predict the product(s), including stereochemical outcome of substitution (SN2), predict and explain the distribution of...
products and display mechanism via curved arrow formalism

given an alcohol substrate in conjunction with H₂CrO₄/PCC be able to predict the products and predict and explain the distribution of products

given an ether substrate in conjunction with HX be able to predict the product(s), including stereochemical outcome of substitution (Sₐ1/Sₐ2), predict and explain the distribution of products and display mechanism via curved arrow formalism

given the reactants be able to predict the products of epoxide opening, predict and explain the distribution of products and display the mechanism via curved arrow formalism under acidic conditions

given the reactants be able to predict the products of epoxide opening, predict and explain the distribution of products and display the mechanism via curved arrow formalism under neutral or basic conditions

Organometallic compounds

given an acetylide ion/organolithium compound/Grignard reagent in conjunction with a compound that possesses OH/NH₂/NHR/SH/≡CH/CO₂H be able to predict the products and predict and explain the distribution of products and display mechanism via curved arrow formalism

given an acetylide ion/organolithium compound/Grignard reagent in conjunction with an epoxide be able to predict the products and predict and explain the distribution of products and display mechanism via curved arrow formalism

Aldehydes and ketones

given an aldehyde/ketone substrate in conjunction with a hydride reducing agent be able to predict the products, predict and explain the distribution of products and display mechanism via curved arrow formalism

given an aldehyde/ketone substrate in conjunction with an acetylide ion/organolithium compound/Grignard reagent be able to predict the products, predict and explain the distribution of products and display mechanism via curved arrow formalism

given an aldehyde/ketone substrate in conjunction with hydrogen cyanide be able to predict the products, predict and explain the distribution of products and display mechanism via curved arrow formalism

given an aldehyde/ketone substrate in conjunction with an amine be able to predict the products, predict and explain the distribution of products and display mechanism via curved arrow formalism

given an aldehyde/ketone substrate in conjunction with an alcohol be able to predict the products, predict and explain the distribution of products and display mechanism via curved arrow formalism
be able to use acetals/ketals as protecting groups

**Carbohydrates**

be able to distinguish between simple carbohydrates and complex carbohydrates, between monosaccharides, disaccharides, oligosaccharides and polysaccharides, between aldoses and ketoses, between trioses, tetroses, pentoses, hexoses, etc, and between D sugars and L sugars

be able to name/draw furanoses, pyranoses, furanosides and pyranosides

be able to recognize alditols, aldonic acids and aldaric acids

given a furanose/pyranose/furanoside/pyranoside in conjunction with sodium borohydride be able to predict the products, predict and explain the distribution of products and display mechanism via curved arrow formalism

given a furanose/pyranose/furanoside/pyranoside in conjunction with bromine be able to predict the products, predict and explain the distribution of products

given a furanose/pyranose/furanoside/pyranoside in conjunction with Tollens reagent be able to predict the products, predict and explain the distribution of products

given a furanose/pyranose/furanoside/pyranoside be able to predict if it will exhibit mutarotation

given a furanose/pyranose/furanoside/pyranoside be able to predict if it is a reducing sugar

be able to use the Kiliani-Fischer synthesis as means for lengthening the carbon chain of an aldose

be able to use the Wohl degradation as a means for shortening the carbon chain of an aldose

be able to deduce the structure of an unknown disaccharide

**Carboxylic acids, esters and related compounds**

be able to understand the general structure of carboxylic acids and carboxylic acid derivatives

given an acyl halide in conjunction with a nucleophilic reagent be able to predict the products, predict and explain the distribution of products and display mechanism via curved arrow formalism

given an ester in conjunction with water be able to predict the hydrolysis products, predict and explain the distribution of products and display mechanism via curved arrow formalism

given an ester in conjunction with alcohol be able to predict the transesterified products, predict and explain the distribution of products and display mechanism via curved arrow formalism

given an ester in conjunction with hydroxide ion be able to predict the saponified products, predict
and explain the distribution of products and display mechanism via curved arrow formalism

given a carboxylic acid in conjunction with alcohol be able to predict the Fischer esterified products, predict and explain the distribution of products and display mechanism via curved arrow formalism

given a carboxylic acid in conjunction with an amine be able to predict the products, predict and explain the distribution of products and display mechanism via curved arrow formalism

*Structure determination*

be familiar with characteristic infrared (IR) absorption bands

be able to understand the intensity of absorption bands in connection with relative bond polarity

be able to understand the position of an absorption band as it relates to Hooke’s law

be able to understand how the position of a particular absorption band is influenced by electron delocalization

be able to interpret and recognize the presence or absence of important functional groups provided an IR spectrum

be able to understand shielding and deshielding in $^1$H nuclear magnetic resonance (NMR) spectroscopy

be able to recognize chemically and non-chemically equivalent protons

be familiar with proton chemical shifts of common functional groups

be able to understand both relative and absolute proton ratios and also signal splitting

be able to predict and interpret spectral features

be able to elucidate structure based on a given proton NMR spectrum

*Aromaticity and chemistry of benzene*

be able to characterize a compound as being aromatic, antiaromatic, or nonaromatic

given benzene in conjunction with nitric and sulfuric acid be able to predict the nitrated product, predict and explain the distribution of products and display mechanism via curved arrow formalism

given benzene in conjunction with a halogen and an iron-based catalyst be able to predict the halogenated product, predict and explain the distribution of products and display mechanism via curved arrow formalism
given benzene in conjunction with sulfuric acid be able to predict the sulfonated product, predict and explain the distribution of products and display mechanism via curved arrow formalism

given benzene in conjunction with an acyl halide and aluminum trihalide be able to predict the acylated product, predict and explain the distribution of products and display mechanism via curved arrow formalism

given benzene in conjunction with an alkyl halide and aluminum trihalide be able to predict the alkylated product, predict and explain the distribution of products and display mechanism via curved arrow formalism

understand electrophilic aromatic substitution reactions of substituted benzenes – effect of substituents on reactivity and orientation

understand the ortho-para ratio