



Sample Course Syllabus

Course CH 331 (4 Credits)

Instructor: Dr. Jeff Walker jeffrey.walker@oregonstate.edu

Course description: Service course covering aliphatic and aromatic chemistry. Introduction to nomenclature, mechanism and synthesis.

Before registering, please refer to [this website](#).

Prerequisites/corequisites: One full year of college level General Chemistry with labs is required. CH 130 does not meet this requirement. CH 331 and CH 332 must be taken in order.

Textbook: Please check with the OSU Bookstore for up-to-date textbook information for the term you enroll (<http://www.osubeaverstore.com/> or 1-800-595-0357). If you purchase course materials from other sources, be very careful to obtain the correct ISBN.

Time requirements: Success in this course often depends on the amount of time devoted to studying the material. This is a 4-credit course, and each credit is meant to reflect about 30 hours of effort.

Participation during the entire term is important to success in this class. Students who have not logged in to Blackboard by the *second Wednesday of the term* **will be dropped from the class**. Students with extenuating circumstances must email the instructor before this date.

Course Content:

1. Review of Lewis structures; hybridization; bonding; acid/base chemistry, stereochemistry
2. Alkanes: nomenclature and physical properties of alkanes and cycloalkanes; conformational analysis of acyclic alkanes and cycloalkanes; halogenation of alkanes and cycloalkanes
3. Alkenes I: structure, nomenclature and physical properties of alkenes; addition of hydrogen halides to alkenes; carbocation rearrangements; addition of water to alkenes; addition of alcohols to alkenes

4. Alkenes II: addition of halogens to alkenes (conversion to vicinal dihalides, halohydrins, and related compounds)
5. Alkenes III; redox reactions in organic chemistry; hydrogenation of alkenes; hydroxylation of alkenes; hydroboration-oxidation of alkenes; oxidative cleavage of alkenes
6. Alkyl Halides I: structure, nomenclature and physical properties of alkyl halides; the SN1 reaction; factors affecting the rate of an SN1 reaction; the SN2 reaction; factors affecting the rate of an SN2 reaction
7. Alkyl Halides II: structure, nomenclature and physical properties of alkyl halides; the E1 reaction; the E2 reaction
8. Alkynes: structure, nomenclature and physical properties of alkynes; addition of hydrogen halides; addition of water; addition of halogens; addition of hydrogen; acetylide ions

Student Learning Outcomes:

The successful student will:

1. Nomenclature
 - a. be able to give IUPAC names of alkanes, cycloalkanes, alkenes, alkyl halides and alkynes
2. Drawing conventions
 - a. be able to use/interpret perspective formulas, Newman projections and Fischer projections
3. Bronsted Lowry acid/base chemistry
 - a. given the reactants be able to predict the products, determine the equilibrium constant and display the mechanism via curved arrow formalism
 - b. be able to rank acids according to their relative acid strengths
 - c. be able to rank bases according to their relative base strengths
4. Lewis acid/base chemistry
 - a. given the reactants be able to predict the products and display the mechanism via curved arrow formalism
5. Alkanes/cycloalkanes
 - a. be able to estimate strain energies of simple alkanes, cycloalkanes and substituted cyclohexanes
 - b. be able to determine the preferred conformation of a substituted cyclohexane
6. Alkenes
 - a. given the reactants be able to predict the products of alkene hydrohalogenation, hydration, halogenation, oxymercuration-reduction and hydroboration-oxidation, predict and explain the distribution of products and display the mechanism via curved arrow formalism
 - b. given the reactants be able to predict the products of alkene hydrogenation, hydroxylation and oxidative cleavage and predict and explain the distribution of products
7. Alkyl halides

- a. given an alkyl halide substrate in conjunction with a nucleophile or base be able to predict the product(s), including stereochemical outcome, of substitution (S_N1/S_N2) or elimination (E1/E2), predict and explain the distribution of products and display mechanism via curved arrow formalism
 - b. you know the differences and similarities between a nucleophile and a base and their use in substitution and elimination
 - c. be able to recognize likely substrates for S_N1/S_N2 substitutions and E1/E2 eliminations in terms of leaving group and alkyl halide substrate degree (i.e., methyl, primary, secondary, or tertiary)
8. Alkynes
- a. given the reactants be able to predict the products of alkyne hydrohalogenation, hydration, halogenation, and hydrogenation, predict and explain the distribution of products and display the mechanism via curved arrow formalism
 - b. you understand how alkyne products are prepared from double elimination of dihalides and display the mechanism via curved arrow formalism
 - c. you understand the formation of acetylide ions from deprotonating terminal alkynes and their subsequent use in substitution chemistry and display mechanistic details via curved arrow formalism
9. Stereochemistry
- a. understand the core concept of "chirality" and can describe this in terms of "handedness" or of superimposability of a mirror image. In addition, you can recognize achiral objects that contain an internal plane of symmetry.
 - b. be able to describe the relationship between the presence of one or more asymmetric center and the chirality of a molecule (or the lack thereof).
 - c. be able to use the Cahn-Prelog-Ingold system to identify group priorities around an atom and define whether the absolute stereochemistry of a particular compound is R or S
 - d. know the definitions of key stereochemical relationships: enantiomers and diastereomers
 - e. know the impact of chirality on "optical activity" (rotation of the plane of polarization for plane-polarized light). You understand the consequence on optical activity for mixtures of stereoisomers.

Exams: Students will take an 80 minute, proctored* midterm exam during a specific time window in week 6 of the term. Students will take a 110 minute, proctored* final exam during a specific time window during Finals week. *The final exam is comprehensive.*

*Proctoring guidelines and registration for proctored exams are available online at the following link: <http://ecampus.oregonstate.edu/services/proctoring/>

No make-up midterm exams will be given. If a student misses the midterm exam due to illness (or other excused absence), the final will count for 140 pts.

Grading:

| | Maximum Points |
|--------------------|----------------|
| Midterm Exam** | 60 |
| Final Exam | 80 |
| Blackboard Quizzes | 60 |
| Final Score | 200 |

**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 %).

Services for Students with Disabilities:

Accommodations are a collaborative effort between students, faculty, and the Disability Access Services (DAS) office. 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 who have not yet obtained approval through DAS, should contact DAS immediately at 541-737-4098.

Expectations for Student Conduct:

Student conduct is governed by the university's policies, as explained in the Office of Student Conduct: Information and Regulations. In an academic community, students and faculty, and staff each have responsibility for maintaining an appropriate learning environment, whether online or in the classroom. Students, faculty, and staff have the responsibility to treat each other with understanding, dignity, and respect. Further information may be found at: <http://oregonstate.edu/admin/stucon/achon.htm>

Academic Integrity:

Students are expected to comply with all regulations pertaining to academic dishonesty, defined as: *An intentional act of deception in which the student seeks to claim credit for the work or effort of another person or uses unauthorized materials or fabricated information in any academic work.* For further information, visit Avoiding Academic Dishonesty, or contact the office of Student Conduct and Mediation at 541-737-3656

Conduct in this online classroom:

Students are expected to conduct themselves in the course (e.g. on discussion boards, email postings) in compliance with the university's regulations regarding civility. Students will be expected to treat all others with the same respect as they

would want afforded to themselves. Disrespectful behavior (such as harassing behavior, personal insults, inappropriate language) or disruptive behaviors are unacceptable and can result in sanctions as defined by Oregon Administrative Rules Division 015 Student Conduct Regulations.

Student Evaluation of Teaching:

We encourage you to engage in the course evaluation process each term – online, of course. The evaluation form will be available toward the end of each term, and you will be sent instructions through ONID. You will login to “Student Online Services” to respond to the online questionnaire. The results on the form are anonymous and are not tabulated until after grades are posted.