CHEM:4372:001 – ADVANCED ORGANIC CHEMISTRY
Fall 2021 Syllabus

Lecture Instructor: Professor Dave Martin
Office: E433 Chemistry Building
E-mail: david-martin@uiowa.edu
Office Hours: In person and/or via Zoom: Mon 1pm-2:30pm, Wed 10:30 am–12:00 pm,
(or by appointment – email Dr. Martin)

Lecture: MWF 9:30 am–10:20 am, W268 CB
Final Exam: Week of Dec 13–17.

Teaching assistant: Hoang Dang (hoang-dang@uiowa.edu), for Office Hours, see ICON

Course Materials:
A molecular model kit (e.g. Duluth Labs, University Chem, Darling, Prentice Hall) is recommended and
allowed in exams. **Models help you visualize organic molecules in 3D and improve your understanding*

Course Prerequisites: CHEM:2220 or CHEM:2240
Website: go to icon.uiowa.edu and log in

Lecture format: This course will be delivered in person at the scheduled time (MWF 9:30 am–10:20
am). I will mostly write notes out in real time with some slides and problems to work through alone or in
groups. Lectures will be interactive, but your participation is key to making this happen! **Out of respect
for your fellow classmates, please help make this a safe and healthy classroom environment by following
University guidelines on COVID-19 and staying home if you feel ill or have been exposed to the virus.
Lecture notes will be made available through ICON and I am available on Zoom to help keep up.**

Chemistry Center (Room E225 CB):
Chemistry Center for drop/add form signing, make-up exam scheduling, alternate textbooks, and tutor
lists. The Chemistry Center manager is Trent Tappan (335-1341).

Review Sessions:
Review sessions will be held before each midterm and the final exam (Time and locations TBA).

Grading:
Homework 100 points Roughly once every week or two between exams
Exam I 75 points Wednesday September 29th
Exam II 75 points Wednesday October 27th
Projects 100 points Presentations after Thanksgiving break.
Final Exam 150 points Week of Dec 13–17, cumulative
Total: 500 points

Regrades
Turn in your exam to the TA or Dr. Martin no later than one week after the initial date of return if you
believe that a mistake has been made in grading. Items to be regraded must be clearly explained on a
cover page. After one week of the initial date of return, all grades are final.

Make-Up Exams:
Make-up exams are given under exceptional circumstances. A valid, written excuse must be provided
prior to a missed exam to the Chemistry Center. If you anticipate having a conflict with an exam, please
see the Chemistry Center ahead of time.

Course Philosophy and Expectations:
This Advanced Organic Chemistry course will continue where Sophomore organic chemistry left off and
cover a variety of reactions, synthesis strategies and literature examples. A thorough understanding of
Sophomore organic chemistry is expected (see Organic Chemistry Survival Guide below). All students
should review the general topics & reaction types (underlined below) over the first couple weeks. The review of these concepts and assigned readings should be completed prior to lecture. **If you need help rebooting your knowledge of Sophomore organic chemistry, please attend Dr. Martin’s office hours.**

**Tentative Schedule of Lectures:** The chapters listed below represent a best estimate of the sequence of the course. We will aim to cover Chapters 1-4 + 8 of Starkey, 2nd Edition in this class. The 1st Edition has fewer problems and lacks Ch. 8. **Note that some chapters are longer than others (e.g. 3).**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapters/Exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Review, Ch. 1+2 Lewis structures, orbitals, bonding, resonance, acid/base, reaction mechanisms.</td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td>Ch. 1+2 Reactions and retrosynthesis, functional groups, Nu and El.</td>
<td></td>
</tr>
<tr>
<td>Week 3</td>
<td>Ch. 1+2 Oxidation/reduction, chemoselectivity and protecting groups.</td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>Ch. 3 Chemoselectivity and protecting groups, redox</td>
<td></td>
</tr>
<tr>
<td>Week 5</td>
<td>Ch. 3 Synthesis of “Monofunctional Target Molecules”, alcohols, ethers, amines by functional group interconversion.</td>
<td></td>
</tr>
<tr>
<td>Week 6</td>
<td>Ch. 3, EXAM I Review.</td>
<td></td>
</tr>
<tr>
<td>Week 7</td>
<td>Ch. 3 More “1-FG Target Molecules”, alkenes, olefination</td>
<td></td>
</tr>
<tr>
<td>Week 8</td>
<td>Ch. 3 Olefination (not in book), alkynes, alkanes</td>
<td></td>
</tr>
<tr>
<td>Week 9</td>
<td>Ch. 3 Aldehydes and ketones, enolate reactions.</td>
<td></td>
</tr>
<tr>
<td>Week 10</td>
<td>Ch. 3-4, EXAM II Enolate reactions, roadmaps.</td>
<td></td>
</tr>
<tr>
<td>Week 11</td>
<td>Ch. 4 Enolate stereochemistry, Evans auxiliary.</td>
<td></td>
</tr>
<tr>
<td>Week 12</td>
<td>Ch. 4, 8 Aldol reaction, stereochemistry, transition metals.</td>
<td></td>
</tr>
<tr>
<td>Week 13</td>
<td>Ch. 8 Transition metal catalysis (Stille/Suzuki/Heck, etc.)</td>
<td></td>
</tr>
<tr>
<td>Week of Nov 22</td>
<td>n/a                Thanksgiving break.</td>
<td></td>
</tr>
<tr>
<td>Week 14</td>
<td>Ch. 8 TM catalysis, <strong>final project presentations</strong></td>
<td></td>
</tr>
<tr>
<td>Week 15</td>
<td>Ch. 8 Final project presentations, final exam review.</td>
<td></td>
</tr>
<tr>
<td>Week of Dec 13</td>
<td>FINAL EXAM     Comprehensive.</td>
<td></td>
</tr>
</tbody>
</table>

**Organic Chemistry Survival Guide:**

- Organic chemistry is fundamentally about the structure of organic molecules, how they react to form new molecules and how we can explain their reactivity by understanding their structure and bonding. If you have mastered concepts from General Chemistry such as Lewis structures, formal charge, molecular orbitals, resonance and hybridization, many things will become intuitive.

- **Organic chemistry is cumulative**. OChem, by its nature, is cumulative. You will need to know structure and bonding and electronegativity to understand reactivity. Concepts of intermolecular forces and polarity will appear over and over. We build on your knowledge of Sophomore organic chemistry and this understanding will also help you in Biochemistry and other subjects.

- **Take notes and draw.** OChem is a visual subject and drawing the structures yourself is the only way to get comfortable drawing them accurately and quickly. Drawing it will also help you remember.

**Chemistry Program Outcomes:**

This course will address the following program outcomes for students pursuing a bachelor’s degree in chemistry (or a minor in chemistry):

- An understanding of the relationship between molecular structure and physical/chemical properties
- Use modern library search tools such as SciFinder to locate and retrieve chemical information
- Read, analyze and critically evaluate journal articles in various subfields of chemistry
- Reference and cite chemical literature appropriately using ACS or other designated citation style
- Report scientific findings in oral presentations in a clear and organized fashion using appropriate visual tools
**College Statement** (copied from Fall 2020 – will be updated)

**Absences and Attendance**

Students are responsible for attending class and for contributing to the learning environment of a course. Students are also responsible for knowing their course absence policies, which will vary by instructor. All absence policies, however, must uphold the UI policy related to student illness, mandatory religious obligations, including Holy Day obligations, unavoidable circumstances, or University authorized activities ([https://clas.uiowa.edu/students/handbook/attendance-absences](https://clas.uiowa.edu/students/handbook/attendance-absences)). Students may use the CLAS absence form to aid communication with the instructor who will decide if the absence is excused or unexcused. The form is located on ICON within the top banner under "Student Tools."

**Academic Integrity**

All undergraduates enrolled in courses offered by CLAS have, in essence, agreed to the College's [Code of Academic Honesty](https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code). Misconduct is reported to the College, resulting in suspension or other sanctions, with sanctions communicated with the student through UI email. Visit this page for information: ([https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code](https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code)).

**Accommodations for Disabilities**

UI is committed to an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as mental health, attention, learning, vision, and physical or health-related condition) by registering with Student Disability Services (SDS). The student is then responsible for discussing specific accommodations with the instructor. More information is at [https://sds.studentlife.uiowa.edu/](https://sds.studentlife.uiowa.edu/).

**Administrative Home of the Course**

The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course and governs its add/drop deadlines, the second-grade-only option, and related policies. Other colleges may have different policies. CLAS policies may be found here: [https://clas.uiowa.edu/students/handbook](https://clas.uiowa.edu/students/handbook).

**Classroom Expectations**

Students are expected to comply with University policies regarding appropriate classroom behavior as outlined in the [Code of Student Life](https://clas.uiowa.edu/students/handbook). This includes the policies and procedures that all students have agreed to regarding the Steps Forward for Fall 2020 in response to the COVID-19 pandemic. Particularly, all students are required to wear a face cover when in a UI building, including a classroom. In addition, the density of seats in classrooms has been reduced. In some instances, this will allow 6 feet or more of distance while other cases, it may be less. Regardless, wearing face coverings and maintaining as much distance as is possible are vital to slowing the spread of COVID-19. In the event that a student disrupts the classroom environment through their failure to comply with the reasonable directive of an instructor or the University, the instructor has the authority to ask that the student immediately leave the space for the remainder of the class period. Additionally, the instructor is asked to report the incident to the [Office of Student Accountability](https://sds.studentlife.uiowa.edu/fall-2020/covid-19-temporary-learning-arrangements/; +1 319 335-1462) for the possibility of additional follow-up. Students who need a temporary alternative learning arrangement related to COVID-19 expectations should contact Student Disability Services ([https://sds.studentlife.uiowa.edu/fall-2020/covid-19-temporary-learning-arrangements/](https://sds.studentlife.uiowa.edu/fall-2020/covid-19-temporary-learning-arrangements/); +1 319 335-1462).

**Communication and the Required Use of UI Email**

Students are responsible for official correspondences sent to the UI email address (uiowa.edu) and must use this address for all communication within UI ([Operations Manual, III.15.2](https://operations.uiowa.edu/operationmanual/)).

**Complaints**

Students with a complaint about an academic issue should first visit with the instructor or course supervisor and then with the Chair of the department or program offering the course; students may next bring the issue to the College of Liberal Arts and Sciences; see this page for more information: ([https://clas.uiowa.edu/students/handbook/student-rights-responsibilities](https://clas.uiowa.edu/students/handbook/student-rights-responsibilities)).
Final Examination Policies
The final exam schedule is announced around the fifth week of classes; students are responsible for knowing the date, time, and place of a final exam. Students should not make travel plans until knowing this information. No exams of any kind are allowed the week before finals with a few exceptions made for particular types of courses such as labs or off-cycle courses: https://registrar.uiowa.edu/final-examination-scheduling-policies.

Nondiscrimination in the Classroom
The University of Iowa is committed to making the classroom a respectful and inclusive space for people of all gender, sexual, racial, religious, and other identities. Toward this goal, students are invited in MyUI to optionally share the names and pronouns they would like their instructors and advisors to use to address them. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University’s Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity (https://diversity.uiowa.edu/eod; +1 319 335-0705 or (diversity.uiowa.edu)

Sexual Harassment
Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community must uphold the UI mission and contribute to a safe environment that enhances learning. Incidents of sexual harassment must be reported immediately. For assistance, please see https://osmrc.uiowa.edu/.

Mental Health
As a student you may experience a range of issues that can cause barriers to learning. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, or loss of motivation. University Counseling Services is here to help with these or other issues you may experience. You can learn about the free, confidential mental health services available on campus by calling 319-335-7294 or visiting https://counseling.uiowa.edu/. Help is always available.

Diversity Statement
It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. Your suggestions about how to improve the value of diversity in this course are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.