

CHEM 4311W: Advanced Organic Chemistry Laboratory

INSTRUCTOR: Dr. Angela L. Perkins, 425 Smith Hall, aperkins@umn.edu

LECTURES: Friday 1:25-2:15pm Kolthoff Hall 139

LABORATORY SECTIONS: Kothoff Hall 594

Mon/Wed: 12:20-5:20 PM or Tues/Thurs: 12:20-5:20 PM

TAs: Alex Umanzor (umanz005@umn.edu) & Andy McCabe (mccab364@umn.edu)

COURSE OBJECTIVES:

- *Build on the technical skills learned in previous introductory organic chemistry courses (i.e. CHEM 2311) and apply this knowledge to more advanced concepts in organic chemistry experimentation.*
- *Provide a course-based research-like experience through experimentation that requires independent problems solving and use of critical thinking skills.*
- *Allow time and freedom for students to plan, implement, and optimize procedures in the area of organic synthesis, including preparation, purification, and spectroscopic exploration of compounds.*
- *Illustrate modern approaches to greening reactions and use of green metrics tools to assess and minimize risks, hazards, and environmental impact from waste.*
- *Develop students' scientific writing skills meeting chemistry department expectations for writing standards.*
- *Prepare each student for success in future endeavors in undergraduate research, graduate school, and/or industrial and academic chemistry employment.*

REQUIRED MATERIALS:

- **Mohrig, J.R.; Alberg, D. G.; Hofmeister, G. E.; Schatz, P. F.; Hammond, C. N. "Laboratory Techniques in Organic Chemistry, Fourth Edition;** W. H. Freeman and Company, New York, **2014.** Hard copies (used) available at the bookstore, Online versions also available.
- **Goggles:** Minnesota state law requires that safety goggles must be worn at all times when working in the laboratory. They can be purchased at the bookstore. Non-U of MN goggles must be approved by the TA/instructor.
- **Laboratory Coat** is required. All chemistry majors should have one issued from the department or one can be purchased at the bookstore.
- **Laboratory Notebook:** A permanently bound notebook (such as a composition notebook and not a spiral-bound) is required for recording all experimental work. All documentation should be recorded in ballpoint ink pens (not pencils or felt-tip pens). Specification for how to keep a proper scientific notebook will be described separately and an important part of the 4311 training/grade.
- **Safety Tutorials:** You are required to complete the three safety training tutorials **before you are permitted to work in the laboratory.** The training information is located at: <https://www.uhs.umn.edu/new-lab>. You will receive an email conformation upon completion of each safety tutorial. Print out a copy of these emails (all three) and submit them to your TA.
 - Chemical Safety
 - Introduction to Research Safety
 - Chemical Waste Management

SOFTWARE REQUIRED:

- **ChemDraw:** This is the universal program used for drawing chemical structures. Instructions for download to either a PC or Mac are posted on the 4311 Canvas site. Alternatively, students can access these tools using [AppsToGo](#) via [Citrix workspace](#)
- **MNova:** This program will be used for working up and analysis of all ¹H NMR spectra.
- **UofMN VPN:** Required for access to all library and literature resources when not on campus.
- **Mendeley or Zotero:** Citation Manager. Optional but you will be glad you learned to use it for referencing.
- **Department of Chemistry [Microlab](#)** supports all students in upper-division chemistry courses.

UMN COVID RESPONSE: 4311 will follow all [University policy](#) with respect to providing a safe academic community and learning environment. Disposable masks will be provided in the laboratory as well as disposable gloves. If you are not feeling well, contact your TA & Dr. Perkins as soon as possible, and please stay home to recover. See the Covid guidelines posted on MyU as well as on the Canvas site.

GRADING: The A-F grading scale will be used corresponding to the GPA points outlined at: [University of Minnesota Grading and Transcript Policies](#)

Your grade will be based on the following criteria:

Assignment Name	Points	% of Grade
Introduction, Safety and Computer Setup	25	2.5
Lab Notebook: preparation and observations (5 x 10 pts)	50	5.0
Lecture Quizzes (4 x 20 points)	80	8.0
Structure Elucidation of an Organic Solid	75	7.5
Literature Assignment	60	6.0
Lab Report – experiment #2	100	10.0
Lab Report – experiment #3A	125	12.5
Lab Report – experiment #3B	125	12.5
Lab Report – experiment #4	300	30.0
Lab technique and participation (overall)	30	3.0
Lab safety, waste handling, cleanliness (citizenship)	30	3.0
	1000	

LECTURE QUIZZES: There will be 4 quizzes given at the beginning of the designated lectures covering topics such as safety, NMR analysis, lab techniques, etc. These will be short (10-15 minutes) quizzes worth 20 points each. Any material that is covered in lecture, experimental handouts or during lab is fair game on these quizzes.

NOTEBOOK DOCUMENTATION: Expectations for notebook documentation before, during, and after experimentation will be posted for each experiment. TAs will randomly check notebooks throughout the semester to assure students are prepared to perform the experiment with a detailed information about the chemicals to be used, safety precautions, and data to be collected. Recording of all steps, observations, and masses/volumes used and obtained are to be made directly in the notebooks. All spectral data should refer to specific pages in the notebook. Only one experiment per notebook page.

LAB TECHNIQUE & SAFETY: These points (6.0% of your grade) will be assigned by your lab TA at the end of the semester and will be based on their observations of your lab technique, participation and safety skills in the lab.

DUE DATES AND LATE WORK: Due dates will be posted on the calendar and can be found in the assignments list on Canvas. Work is to be turned in at the **BEGINNING** of the lab period, directly to the TA unless otherwise indicated on Canvas. Late assignments will receive a 3% deduction for every day late.

CREDITS AND WORKLOAD: One credit is normally defined as equivalent to an average (over a full semester) of three hours of learning effort per week necessary for an average student to achieve an average grade in the course. This particular 4-credit course meets for one hour of lecture and ten hours of lab per week. Many students can complete their day's work in less than five hours which provide ample opportunity for receiving TA help on assignments or using the computer lab. Use this time wisely.

Technically, that leaves only another hour per week outside of the classroom and lab, but in practice, a student who will achieve an average grade might spend an additional five hours per week on preparations, reading, calculations, data analyses, and writing reports. Most students who will achieve an above-average grade devote even more time to this course. **Reminder:** There is no final exam, so that also allows you to increase the number of hours per week.

STUDENT CONDUCT CODE: The University seeks an environment that promotes academic achievement and integrity that is protective of free inquiry and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the

physical or mental health or safety of members of the University community. As a student at the University, you are expected adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see: [University of Minnesota Student Conduct Code](#).

Note that the conduct code specifically addresses disruptive classroom conduct, which means, "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

TIME MANAGEMENT AND ABSENCES: Though experimental work is tentatively assigned start dates, students work at their own pace to complete the assignments and labs over multiple periods. Often students will need to repeat steps or start a synthetic sequence over. It is not a competition to see who finishes first, rather building skills and budgeting time so that due dates can be met.

Therefore, no makeup labs are scheduled. Legitimate absences such as major illness and/or family emergencies that affect a student's ability to complete all assigned work will be considered on a case-by-case basis, and handled in a fair manner. See the following website for relevant University of Minnesota policies: <https://policy.umn.edu/education/makeupwork>

SCHOLASTIC DISHONESTY: You are expected to do your own academic work and cite sources as necessary. Failure to do so is considered scholastic dishonesty, and includes plagiarizing [which means misrepresenting as your own work any part of work done by another]; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (https://regents.umn.edu/sites/regents.umn.edu/files/policies/Student_Conduct_Code.pdf)

As a general matter of University of Minnesota policy, "a student who has been determined to have cheated may be given an "F" or an "N" for the course, and may face additional sanctions from the University." For additional information, please see: <https://policy.umn.edu/education/instructorresp>

Specifically with respect to this laboratory course, there have been (thankfully, not many) occasions in the past when two or three students submitted work that was identical in some portions. This is not acceptable, and results in a severe grade penalty. Your data, interpretations, graphics, etc., must be your own.

The Office for Community Standards has compiled some useful information: <https://communitystandards.umn.edu/avoid-violations/avoiding-scholastic-dishonesty>

The University of Minnesota policies continue with: "If you have additional questions, please clarify with your instructor for the course." In the context of this class, you are not allowed to collaborate on the specifics of assignments, but you are allowed (in fact are even encouraged) to consult with your TA and classmates about more general aspects. On the reports that you turn in for evaluation of your work in this class, it is absolutely necessary that you follow standard conventions followed by professional chemists for citing sources, be they written or on the internet, for the experimental procedures followed, for your interpretations of data, and for previously published work in the field that provides background and puts your own contributions into perspective.

DISABILITY ACCOMMODATIONS: The University views disability as an important aspect of diversity, and is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

- If you have, or think you have, a disability in any area such as, mental health, attention, learning, chronic health, sensory, or physical, please contact the DRC office on your campus (UM Twin Cities - 626.1333) to arrange a confidential discussion regarding equitable access and reasonable accommodations. <https://diversity.umn.edu/disability/>, drc@umn.edu
- Students with short-term disabilities, such as a broken arm, can often work with instructors to minimize classroom barriers. In situations where additional assistance is needed, students should contact the DRC as noted above.

- If you are registered with the DRC and have a disability accommodation letter dated for this semester or this year, please contact your instructor early in the semester to review how the accommodations will be applied in the course.
- If you are registered with the DRC and have questions or concerns about your accommodations please contact your (access consultant/disability specialist).

MENTAL HEALTH AND STRESS MANAGEMENT: As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating, and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via <http://www.mentalhealth.umn.edu/>

EQUITY, DIVERSITY, EQUAL OPPORTUNITY, AND AFFIRMATIVE ACTION: We welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences to this course. Instructors, teaching assistants, and peer students are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. This is in agreement with university policy: http://regents.umn.edu/sites/regents.umn.edu/files/policies/Equity_Diversity_EO_AA.pdf

Collaboration among people of all cultures and backgrounds enhances our experiences and contributes to excellence in teaching, learning, and research. We strive for a climate that celebrates our differences and strengthens our department by embracing and working to increase diversity, equity, and inclusion. For more information about our departmental efforts and upcoming activities: <https://sites.google.com/umn.edu/chemintranet/diversity-inclusion>. For a list of diversity related resources: <https://sites.google.com/umn.edu/chemintranet/diversity-inclusion/resources>.

SEXUAL HARASSMENT AND RELATED: In this course, we strive to provide a safe and positive environment for everyone. Please review policy regarding sexual harassment and related topics: <https://policy.umn.edu/hr/sexharassassault>
For support and help please contact the Aurora Center: <http://aurora.umn.edu>

ACADEMIC FREEDOM AND RESPONSIBILITY: Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.* Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair of Chemistry (Dr. David Blank), your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs (Dr. Ellen Longmire) in the Office of the Provost.

* *Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".*

ADDITIONAL RESOURCES:

- **Student Conflict Resolution Center:** <http://www.sos.umn.edu>
- **Appropriate Student Use of Class Notes and Course Materials:** <https://policy.umn.edu/education/studentresp>