

# CHEM 2311: Organic Lab

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University of Minnesota, Department of Chemistry, Smith Hall 5

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## We Are All in this Together



Welcome to CHEM 2311: Organic Lab. My name is Dr. Will Howitz and I will be your instructor for this course. You may call me Dr. Howitz or Dr. H.

Lab courses are traditionally rigorous and time-consuming because they involve a substantial amount of preparation (for safety reasons), and they focus on the application of chemical principles learned in the associated lecture courses. As such this course will not be easy, but I have designed it to be flexible to account for the additional academic and non-academic challenges you may be facing. I look forward to working with you all this semester!

Here are the general principles we will all, as a class, operate under:

- Communication will be extremely important. We will communicate with each other frequently and as transparently as possible.
- None of us know what others are dealing with. This is even more important to remember when we communicate online. Some of us may become ill. Some of us may have one or more disabilities. Some of us may be contending with mental health challenges. Some of us are caring for family members or helping our families get by in precarious health or financial circumstances. Some of us may be in precarious financial situations ourselves. We will all be kind and forgiving to each other and to ourselves.
- If we need help, we will ask for it. We ALL need help in some way.

### Office Hours:

See calendar on Canvas

### Weekly Experiment

#### Schedule:

See calendar on Canvas

### Lab Lecture in Bruininks Hall 220:

- 1) Section 001  
11:15 am – 12:05 pm
- 2) Section 002  
12:20 pm – 1:10 pm
- 3) Section 003  
4:55 pm – 5:45 pm

### Course Prerequisites:

CHEM 2301 (≥ C-)

### Course Corequisites:

CHEM 2302

### Required Materials:

- 1) LabArchives  
Electronic  
Laboratory Notebook  
(ELN, \$25)



- 2) Personal Protective Equipment (PPE)
  - Lab coat (\$30)
  - Safety goggles (\$13)
  - Disposable nitrile gloves will be provided in the lab
  - Masks are optional, but are not provided

If you do not have a lab coat or safety goggles, you may purchase them from the UMN bookstore.



## Introduction/Course Description

This organic chemistry laboratory course will provide you with an opportunity to learn about the synthesis, separation, purification, and identification of organic compounds in a hands-on manner. The experiments in this course are designed to help you develop the observational and critical thinking skills that are essential prerequisites for a successful career in science (or any professional field). You will be expected not only to perform the experiments in the laboratory, but also to think about the principles behind the experiments.

## Student Learning Outcomes

By the end of the course, students will be able to:

- 1) Perform fundamental organic chemistry techniques (IR and NMR spectroscopy, thin layer chromatography, melting point analysis, recrystallization, extraction, gas chromatography, and fractional and steam distillation) in the context of laboratory experiments.
- 2) Identify and explain the concepts and chemical principles underlying fundamental techniques.
- 3) Propose solutions to actual or potential problems encountered during an experiment.
- 4) Accurately draw mechanisms for reactions conducted in the lab.
- 5) Determine structures of unknown molecules using spectroscopy data.
- 6) Maintain an organized and well-documented lab notebook.
- 7) Make claims supported by evidence using data collected from an experiment.
- 8) Summarize and evaluate laboratory safety control measures.

## Tips for Success

- **Ask questions.** This can be in lab, via e-mail, during office hours, or on Piazza. I know this content is not always easy to pick up, so I am always happy to clarify and provide assistance. Don't worry, I'm friendly. 😊
- **Make connections.** You are in a class with many wonderful people. They are working hard to learn the same content as you. Be willing to ask a peer for direction or be that student that helps another. We are a community that is stronger together.
- **Think through experiments.** Evaluate why each step is included. If you know why you are doing something, it will become easier to identify when and why an experiment might go wrong and troubleshoot your way to promising solutions.

## **Course Modules**

- 1) Before Lab Lecture
  - Review materials that will help you get the most out of the lab lecture.
- 2) Lab Lecture
  - Expectations for the lab, critical concepts, and interactive exercises will be covered by the instructor.
- 3) Pre-Lab
  - Watch experiment-specific videos, complete the associated video quizzes, fill out the required sections of the ELN, and complete the prep eval by 11:59 pm the day before the lab.
- 4) In-Lab
  - Perform an experiment in lab and fill in the remaining sections of your ELN. ELN pages must be submitted to Canvas by 11:59 pm the day after the lab.
- 5) Post-Lab
  - Complete a lab report based on the experiment performed. Must be submitted to Canvas within one week of the experiment at 11:59 pm.

# **General Course Policies**

## **Academic Integrity:**

All students are expected to adhere to the University of Minnesota Student Conduct Code (for more information, please visit [https://regents.umn.edu/sites/regents.umn.edu/files/2022-07/policy\\_student\\_conduct\\_code.pdf](https://regents.umn.edu/sites/regents.umn.edu/files/2022-07/policy_student_conduct_code.pdf)). Briefly, copying others' work in part or in whole constitutes academic dishonesty. It is also dishonest to provide work on behalf of another student as it does not represent their own original work. Both of these acts are detrimental to you and your peers' success as you do not learn or retain valuable course material. It is always okay to ask if something you are considering doing would be considered an academic integrity violation. There is no penalty for asking. However, if you commit an act of academic dishonesty, you will be reported to the University of Minnesota Office for Community Standards.

## **Attendance/Participation:**

Labs will be held in-person. You must attend and complete every experiment to be eligible to earn a passing grade in the course. Lab lectures will also be held in-person. Recordings will be available within 24 hours following the lab lecture. A detailed absence policy is included in a separate document in the "Getting Ready" module.

## **Appropriate Behavior in Class:**

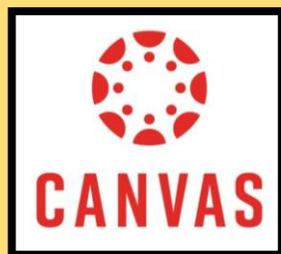
To ensure a positive learning environment for each student, be tolerant, understanding, and respectful of one another. Be self-aware of your actions in class. Evaluate if they constitute constructive behaviors. If your actions negatively impact the ability of other students to learn, or risk your safety or the safety of others, you will be asked to leave.

## **Laboratory Admittance:**

Students must complete all required pre-lab work by 11:59 pm the day before each lab. No student will be permitted to enter the lab if they have missing or incomplete pre-lab work. In addition, all students must have the required PPE and be wearing proper attire. What constitutes proper attire may be found in the "Laboratory Safety Policies" document on Canvas. If you arrive to lab more than 15 minutes after the start of the lab, you will not be permitted entry and must contact the instructor to see what, if any, make-up lab accommodations may be granted.

## **E-Mail Etiquette:**

When sending e-mails, please include your first and last name, your lab section day/time, and your TA's name. This information will give me context that will help ensure I can give you a swift and proper response to your questions. In your e-mails (which MUST be sent from your @umn.edu email), please address me as Dr. Howitz or Dr. H and use polite language as you craft your e-mails. I will respond to emails within 48 hours. If I have not responded after 48 hours, please resend your email as I may have accidentally overlooked it.



## Required Technology

### Canvas:

You are responsible for keeping up to date on course content, announcements, and assignment due dates on the Canvas website. Content is organized into experiment modules that can be accessed from the home page using the module navigation buttons.

### LabArchives Electronic Lab Notebook (ELN):

All students will access their own copy of the course LabArchives ELN during the first week of the course. Be aware that there is a \$25 fee that must be paid within the first 30 days of accessing the ELN. This fee is paid directly through LabArchives rather than being charged to your student account through the bookstore (because the bookstore charges a mark-up). If you are experiencing financial difficulty and cannot afford this purchase, please reach out to the instructor.

The ELN will contain a folder for each experiment and within each folder will be a notebook page that needs to be filled in. As the course progresses, you will be expected to build and fill in more of the content in each page on your own. Do not delete any of the pages in your notebook as they cannot be easily added back. Be sure to review the "LabArchives Electronic Lab Notebook (ELN) Guidelines" document on Canvas for more information about how to use and fill out the ELN.

### MNOVA:

You will collect  $^1\text{H}$  NMR spectra as part of several experiments in this course. The analysis of these spectra will be done using a program called MNOVA. Review the "Downloading, Installing, and Using MNOVA for Analysis of NMR Spectra" document and "Using MNOVA to Analyze an NMR Spectrum Video" in the "Experiment 1" module on Canvas for more information.

### ChemDraw:

ChemDraw is a drawing tool that allows you to depict chemical structures, reactions, and mechanisms. While you are encouraged to use ChemDraw for your lab notebook and post-lab assignments (especially if you are a chemistry major), it is not required. The program may be accessed via AppsToGo and instructions for accessing the program may be found in the "How to Access ChemDraw" page in the "Getting Ready" module on Canvas.

### Cisco VPN:

This program will allow you to access ChemDraw (via AppsToGo) when you are off campus. Instructions for downloading, installing, and running the VPN may be found here: <https://it.umn.edu/services-technologies/virtual-private-network-vpn>

## Why Specifications Grading?

- There are many reasons why this grading system is in place and I unfortunately do not have the space here to go into them in detail, but here are a few good references about the benefits of this grading system.
- Watch this [seminar](#) by Professor Renée Link.



- Read this [C&EN article](#).



- Read this Journal of Chemical Education [article](#) about the outcomes of using specifications grading in organic chemistry lab courses. This [article](#) follows up on the first one, giving even more detailed info.

## Course Grading System

This course is graded using a system called specifications grading. In this system you are not competing against any other students because there is no curve. Every student has the opportunity to earn an A grade.

### How Do I Earn the Grade I Want?

A set of guidelines for each letter grade is outlined in the CHEM 2311 Student Grade Tracker document posted in the “Getting Ready” module on Canvas. To earn a letter grade, complete all the requirements listed for that grade. These requirements consist of satisfactorily completing specific numbers and types of assignments where more assignments must be completed satisfactorily to earn higher letter grades. If you are missing any requirement for a letter grade, you will not earn that grade and will instead earn the highest one for which you have met all the requirements. Check your grade tracker against your assignments regularly to stay on track. It is recommended that you use the version of the grade tracker that has the checkboxes for this purpose.

Be aware that the requirements to earn the base letter grade (i.e. A, B, C, or F) are distinct from the requirements to earn the modification to the base letter grade (i.e. a plus, a minus, or neither a plus nor a minus).

### What Does “Satisfactory” Mean?

Earning a satisfactory grade on an assignment means that you have met or exceeded the minimum requirements to pass that assignment. The exact requirements vary by assignment and are always listed on the rubric. The threshold for passing an assignment is based on the achievement of proficiency, NOT perfection. You can make mistakes and still pass, but you should aim to make your assignment submissions the best possible quality.

### How Will I Know if My Assignment is “Satisfactory?”

If the assignment is assessed as “Satisfactory,” it will show up as “Complete” in the gradebook. If it is not assessed as “Satisfactory,” it will show up as “Incomplete” in the gradebook. Assignments that are “Incomplete” are classified as “Needs Revision.”

### Additional Grading Policies

- It is your responsibility to ensure your assignments are submitted on time, follow all required formatting rules, and are submitted to Canvas correctly.
- Any assignments that do not follow formatting rules will not receive feedback and will be automatically assessed as “Needs Revision.”
- If an assignment is submitted late, feedback and an assessment will still be given. However, if a late assignment is assessed as “Satisfactory,” the assessment will not count toward meeting the requirements for a letter grade unless a token(s) are exchanged for one or more late passes.

### What Do I Do if My Assignment “Needs Revision?”

An assignment assessed as “Needs Revision” may be treated in one of two ways:

1. You may revise and resubmit the assignment in exchange for a certain number of tokens. Check the “Token Trade-In List” to see how many tokens are required to revise and resubmit an assignment that was assessed as “Needs Revision.” A post-lab report, for example, requires 1 token and the post-lab must be revised and resubmitted within 3 days of receiving the “Needs Revision” assessment. You only need to revise sections that were marked as “No Marks” on the rubric. **Any revised content MUST be highlighted in yellow** so your TA may easily find and regrade the parts of the assignment that required revision. Note that all revised and resubmitted assignments must still follow the formatting rules detailed in the assignment instructions.
2. You may choose to accept the “Needs Revision” assessment and move on. This is an option because you do not need to earn a “Satisfactory” assessment on every single assignment in the course. Be sure to check the CHEM 2311 Student Grade Tracker for details on how many assignments must be assessed as “Satisfactory” to earn each letter grade.

### What Are Tokens?”

Tokens are a form of digital currency for this course. They are designed to be your safety net! You can exchange tokens for a variety of things in the course such as a 24-hour late pass for an assignment, an opportunity to revise and resubmit an assignment that was assessed as “Needs Revision,” and several other options. Check out the “Token Trade-In List” on Canvas to see all of the things you can exchange tokens for and how many tokens are required for each exchange. You have the opportunity to earn four tokens at the start of the course by completing the “How I Earned...” assignment by the end of the first week of the term. Up to five additional tokens may be earned during the course by completing surveys and other special assignments so watch out for these opportunities!

### How Do I Redeem My Tokens?”

1. Check your token balance on Canvas. Token balances are updated at the end of each week by Sunday at 11:59 pm. If you KNOW that you already used a token but your balance has not changed yet, you are responsible for knowing and being honest about your current token status. Token dishonesty counts as a violation of the Academic Integrity Policy!
2. Fill out the Token Trade-In Request Form on Canvas.
3. Follow the instructions in the form to forward your confirmation email to your lab section TA or me. What you are exchanging the tokens for determines the person you forward the confirmation email to.



Icons from Flaticon

## Assessments

### Lab Lecture Participation:

Participation will be evaluated by submission of work completed during the lecture. To earn credit, you must attend the entire lab lecture and participate in all activities.

### Video Quizzes:

To prepare you for each experiment, pre-lab videos will be available to you to watch. Each video is accompanied by a video quiz designed to assess your comprehension of the video content. You will have two attempts for each quiz and the higher of the two scores will be kept.

### Prep Evals:

Once you complete the required pre-lab sections of your ELN for each experiment, you will complete a prep eval (Canvas quiz) to validate that you are appropriately prepared for lab. You will have two attempts for each prep eval and the higher of the two scores will be kept. You **MUST** use your second attempt if you did not earn a perfect score on your first attempt. Your score on each prep eval will determine whether you are permitted to attend the lab or not.

### Lab Notebook:

The pages of your LabArchives ELN must be submitted to Canvas as a PDF by 11:59 pm the day after the lab. A rubric is included in each Canvas assignment for your reference.

### Post-Lab Reports:

Each experiment will have a post-lab report you must submit to Canvas as a PDF by 11:59 pm within one week of the experiment. A rubric for each report is included in each Canvas assignment for your reference.

### Laboratory Final:

There are three components to the final:

1. Knowledge Check Final (Online): Answer multiple choice questions about laboratory fundamentals.
2. Technique Finals (In-Person): Demonstrate proficiency with fundamental lab techniques (extraction, recrystallization, TLC). You will need to write and diagram procedures, perform calculations, and answer troubleshooting questions.
3. Mastery Project: An assessment composed of questions requiring the upper-level skills of Bloom's taxonomy (apply, analyze, evaluate, create) to answer without as much guidance as was provided for previous course assignments to demonstrate that you are approaching mastery of the course content.

More information about the final exam components may be found under the "Final Exams Instructions and Practice" module on Canvas.

## **Additional Course Policies**

### **Expected Time per Course Credit:**

CHEM 2311 is a 4-credit course which means that you are expected to put in an average of 12 hours of work outside of class to earn an average grade. More information may be found here:

<https://policy.umn.edu/education/timepercredit>.

### **Appropriate Use of Class Notes and Materials:**

All content created for this course is the intellectual property of the instructor (me) and the University. Course materials and content may not be disseminated on paper or online without my express consent.

### **Academic Freedom:**

Academic freedom is a cornerstone of the University. Within the scope and content of this course as defined by me, it includes the freedom to discuss relevant matters in the classroom. You are free to take reasoned exception to the views offered in this course and to reserve judgment about matters of opinion, but you are responsible for learning the content of this course as long as you are enrolled in it.

### **Inclusive Teaching:**

Inclusive teaching involves deliberately cultivating a learning environment where all students are treated equitably, have equal access to learning, and feel valued and supported in their learning. It is my intent that the diversity that students bring to this course be viewed as a resource, strength, and benefit. It is also my intent to present materials and activities that are respectful of diversity. I acknowledge that I am not an expert on diversity, equity, and inclusivity, but I am committed to further educating myself to better support all of you. Please know that you are welcome and encouraged to share with me (either directly or anonymously) any suggestions for improvement. I value and appreciate your perspectives!

### **Sexual Misconduct:**

University faculty are committed to helping create a safe and open learning environment for all students. If you (or someone you know) have experienced any form of sexual misconduct, including sexual assault, dating or domestic violence, or stalking, know that help and support are available. The University strongly encourages all members of the community to take action, seek support, and report incidents of sexual misconduct to the Title IX Office. You may contact the Title IX Office at 612-624-9547 or at [eot@umn.edu](mailto:eot@umn.edu) or learn more by visiting [eot.umn.edu](http://eot.umn.edu). Please be aware that under Title IX of the Education Amendments of 1972, I am required to disclose information about sexual misconduct to the Title IX Office. If you wish to receive support through a confidential resource, please see <https://eot.umn.edu/access-confidential-support>.

### **Commitment to You:**

I am very aware that now, more than ever, you are contending with additional academic and non-academic challenges that may impact your studies. My intention with this course is to provide you with a supportive framework that will help you to achieve proficiency in the course learning outcomes while accounting for the additional challenges you are facing.

If at any point you have concerns about your standing in this course, or are experiencing extenuating circumstances, please do not hesitate to reach out to me. I am invested in each of you and want to see you all succeed!



The instructor reserves the right to make any changes necessary to the course during the term as appropriate.

## **Disability Services**

Any students that feel they may need accommodations should contact me privately to discuss his or her needs. It is also imperative that you contact the Disability Resource Center (DRC) as soon as possible at 612-626-1333 or [drc@umn.edu](mailto:drc@umn.edu) to ensure appropriate accommodations are made in a timely fashion.

## **Mental Health and Well-being**

You may experience a range of challenges, academic and non-academic, that affect your mental health and well-being which may in turn impact your learning and course performance. University services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus here: <https://safe-campus.umn.edu/personal-wellbeing>. If you feel your

## **Additional Campus Resources**

1. [Multicultural Center for Academic Excellence](#): Provides resources and services to support student retention and engagement, especially of first-generational students and historically and systemically excluded students.
2. [International Student and Scholar Services](#): Provides services that include visa and immigration support.
3. [Student Counseling Services](#): Provides a broad range of mental health services.
4. [Transfer Student Experience](#): Provides resources and support to transfer students.
5. [Gender and Sexuality Center for Queer and Trans Life](#): Provides resources and support to LGBTQIA+ students.
6. [The Women's Center](#): Provides resources and support to women.