

CHEM 110L – Intermediate Organic Chemistry Lab

Have you ever wondered why *roses are red* and *violets are blue*? Why are plastics such a danger to our planet? What happens to your food as it digests? **Organic chemistry has the answers!** Trillions upon trillions of super small molecules are make up the colors that we see, the containers we eat and drink from, and the food we eat. Most of these life-sustaining molecules are organic (have a carbon backbone). Continue your ochem journey and learn the behind-the-scenes magic that make life possible!

Instructor: Caitlin Binder, Ph.D.; cabinde@ucsc.edu	HW Club (office hours): TuW 2-3pm <i>via</i> Zoom 1-on-1 appointment with Caitlin via calendar link in Canvas intro module
Roby Jenkins (Wed labs, rojenkin@ucsc.edu) & Sophie Hollow (TuTh labs, shollow@ucsc.edu) ^ Teaching Assistants are here to support you in lab and office hours - schedule on Canvas	
With special appearances by: Olivia Matsumoto-Elliott (omatsumo@ucsc.edu) Skyler Thayer (sthayer@ucsc.edu) & Eris Minckler (ealbertm@ucsc.edu) – valued chemistry prep staff!	

Course Description: CHEM 110L (2 units) is a course in synthetic organic chemistry and requires proficiency in the techniques learned in 8L/M. Experiments involve the preparation, purification, characterization, and identification of organic compounds, making use of modern as well as classical techniques. Technical writing skills and structural elucidation with NMR spectroscopy are emphasized. **Prerequisites:** CHEM 8M and previous or concurrent enrollment in CHEM 110.

Course Materials – Canvas Modules: canvas.ucsc.edu; **assignment schedule on Page 6**

- Lecture note templates – print, download, or copy by hand before Friday classes
 - Lecture recordings will be posted on Canvas / YuJa
- Lab PDFs – background reading, procedure, and lab report details for each experiment
 - **GradeScope:** online tool to upload lab reports and get detailed feedback; linked through Canvas
- Designated lab notebook is required – any bound notebook is great, except we advise against spiral-bound
- Safety equipment provided in lab: goggles, lab coat, and gloves
- *Optional textbook:* Mohrig, J. R.; *et. al.* "Techniques in Organic Chemistry, 4th Edition" Freeman, 2015 (other editions acceptable, use lecture titles for reading assignments)

Course Structure & Policies

- First of weekly lab lectures is Friday, April 7th at 9:20-10:25am in Porter Acad. 144
 - Valuable guidance with preparing for lab, understanding experiments, doing well on lab reports, etc.
 - Lectures are recorded and posted on Canvas and published in YuJa
- **Attendance to TuWTh labs is required**
 - **Week 1 = Lab Basics** – dress appropriately, bring calculator & writing utensil
 - **Week 2 & Beyond = Experiments!!** Prepare your lab notebook & take the pre-lab quiz before lab.
 - Please communicate with Caitlin and your TA if you cannot attend a lab.
 - I'm sorry but we cannot personally provide remote accommodations. Contact your advising office and/or drc@ucsc.edu for help.
- One excused lab - complete **at least five out of the six wet-lab experiments to pass the course.**
 - Exp 4 – NMR Worksheet is required for everyone. Exp 3 assignments are required (not dropped).
- Enrolled students must be present **within the first 15 minutes of the first lab meeting or risk being dropped from the course.** Email your TA and Caitlin immediately if you are absolutely unable to attend the first lab meeting so we can make other arrangements.
- Please attend your enrolled secondary lab section. If you have a reasonable excuse to miss lab, email your TA **before your lab starts** to request a makeup lab or asynchronous arrangements.
 - Email your TA if you will be late to section. It may be more appropriate to schedule a makeup lab.
- **Scheduling makeup labs** – thx for understanding that due to limited space, makeup labs are not guaranteed. The earlier you reach out, the better.
 - Read the 'Makeups, Excused Lab & Remote Accommodations' page in the Canvas intro module.

HOW THE LAB WORKS

Experiment components and *three (3) associated assignments* are outlined below and organized on Canvas.

Before Lab

- Read the **lab PDF**, watch the **pre-lab videos**, and attend / watch **lecture**
- Prepare for the pre-lab quiz by completing the **pre-lab questions** in the lab PDF
- Take **pre-lab quiz** on Canvas before your enrolled lab section's start time
- Complete the **purpose, reagent table**, & the **procedure diagrams** outlined in the **Worksheet**
 - **Procedure Diagrams must be complete before you can start the lab**
 - **Labeled equipment, chemical names with amounts, & safety notes**
 - Reference **class notes & Slugs@home platform** - Equipment & Safety, pictures & videos

During Lab

- Please arrive at least 5 minutes early to lab
- **Check-ins & Pre-lab talk**
- Students perform **the lab** individually or in pairs, depending on the lab
- Complete your lab **notebook pages** and show TA for credit – data, observations, partner agreements
- **In-lab questions** are discussed as a group, along with any other Q&A.

After lab

- **Meet with your lab partner** to exchange and proofread each other's contributions to the lab report, if applicable
- Submit the **lab report** on GradeScope, one week after experiment is performed

Miscellaneous Policies – Assignments & Attendance

- Consult Canvas and the schedule (next page) for experiment due dates. Email your TA before the due date / time to request an extension on assignments.
- **Email your TA (cc Caitlin) ASAP if you have any issues with attendance, submitting assignments, etc. We're open to new policies and accommodations for students in need but we need to know what's going on!**
- Students can improve by incorporating feedback from graded reports into future assignments (yay GradeScope!).
 - Your TA is happy to *discuss* any grading concerns in a kind & compassionate manner, however, we will not tolerate arguing or rude behavior.
 - Submit brief regrade requests directly in GradeScope within 1 week – instructions on Canvas.
- *If you do not turn in 2 reports or do not participate in 2 lab days without contacting the TA, you cannot pass the course.*

Assignment Breakdown (1000 Point Total)

- (50 points, 5%) **Intro Assignments:** GradeScope Test, Honor Code (Academic Integrity)
- (250 points, 25%) **Lab Worksheets / Notebook Pages** – lowest quiz score dropped, except for Exp 3
- (200 points, 20%) **Pre-Lab Quizzes** – lowest quiz score dropped, except for Exp 3
- (400 points, 40%) **Lab Reports** – lowest report score dropped, except for Exp 3
- (100 points, 10%) **NMR Worksheets**

Grade Distribution

A+ 98.00 – 100%	A 93.00 – 97.99%	A- 90.00 – 92.99%
B+ 88.00 – 89.99%	B 83.00 – 87.99%	B- 80.00 – 82.99%
C+ 78.00 – 79.99%		C 70.00 – 76.99%
C- 60.00 – 69.99%	D 55.00 – 59.99%	F < 55.00%

BEFORE: Lab Preparation

Pre-Lab Video(s) - Canvas Modules include links to the **Slugs@home** platform and animated concept videos to watch before lab. These give you a safe preview of the experiment to guide your notebook preparation.

PRE-LAB QUIZ – Experiments PDFs containing pre-lab questions are posted on Canvas. Take the Canvas pre-lab quiz before your enrolled section. The quiz includes pre-lab questions that may be reworded, in a different order, or otherwise be presented differently than the pre-lab questions. This is due to the Canvas quiz format, not to confuse you!

- **Be prepared with your responses to the pre-lab questions before starting the quiz.**
- There is a 20-minute time limit on the quiz and you get two attempts.
 - **Make sure you have enough time to complete the quiz - you can't save and come back later.**
 - If you choose to re-take the quiz, your grade will be the highest of the two attempts.
- The lowest pre-lab quiz grade is dropped.
- **Though we generally encourage collaboration, the pre-lab quiz is an individual assignment.**
 - The responses should be a product of your original work to assess *your* understanding of the material.
 - **Sharing your quiz or the correct responses in any format (screenshots, email, CHEGG, social media, text, carrier pigeon, etc.) is in violation of the UCSC academic integrity policy (more details later in syllabus).**

DURING: Lab Worksheets & Notebook Pages - Canvas**Participation**

Each experiment Canvas Module includes a worksheet for students to use as a lab notebook template to report data & observations for that experiment. Diagrams of key procedural segments) are also turned in with the lab worksheet on Canvas. Each lab PDF on Canvas has a breakdown of experiment segments and requirements for that lab. **All equipment, chemicals and amounts, and safety notes must be present in each segment for full credit.** Draw **diagrams** to explain key parts of the procedure with limited words, including equipment and chemical names. A full step-wise procedure is NOT required or expected.

- Participation credit is given by showing your TA your completed lab notebook pages at the end of lab.
- Please be present within the first 10 minutes of lab for credit, or email your TA.

AFTER: Lab Reports - GradeScope

Reports are completed individually or in pairs, depending on the experiment and are due one week after lab. Students work on the report together in lab, select parts of the report to finish at home, then meet to exchange and proofread each other's work at least a day or two before the due date. The idea is to promote collaboration and hold each other accountable. One student submits the assignment on Canvas / GradeScope and both students get that same grade. Make sure to select your partner after uploading the report to GradeScope!! The lowest report score is dropped.

Reports are **typed** with the exception of notebook pages, figures, structures, mechanisms, and calculations. The components are described below and additional **writing guidelines** are online. **Get help with your assignments, ideally during lab or at least several days before the due date!**

EXPERIMENTALS AND/OR ABSTRACTS ARE REQUIRED ON SOME REPORTS

- Please refer to writing guidelines on Canvas and specific notes in the lab PDF

IN-LAB QUESTIONS

- Type the responses to in-lab questions in complete sentences.
- Calculations, structures, and mechanisms may be hand-written.
- Tables should be given clear labels (**Table 1**, etc.) and a descriptive title.

Neatness & Organization

- Refer to report guidelines above, in the experiment handout, and the writing guidelines.

This includes spelling, grammar, format, and overall clarity.

Academic Integrity - https://www.ue.ucsc.edu/academic_integrity
Complete the Academic Integrity Agreement form on Canvas

Students are encouraged to discuss the experiments. Below is an overview of assignments that should be completed individually vs. those that are turned in with a partner. A pair of students come up with a **Partner Agreement** on the day of lab to determine how they'll complete the assignment. One student submits the final assignment on Canvas / GradeScope and both students get that same grade. The idea is to incentivize collaboration and hold each other accountable.

- **Individual:** Pre-lab quizzes, Canvas Discussions, Worksheets & Notebook Pages
- **Pairs:** Lab reports – in-lab questions, experimental methods, and abstracts

Collaboration is great, but each partnership should submit original work. *Zero points will be assigned to duplicate lab reports, or sections of lab reports that are obviously copied from another group, at the TA's discretion.* Such incidents will be reported to the UCSC Academic Misconduct office. This is an unfortunate but necessary consequence.

We want our **expectations** of you to be clear to set you up for success! Please feel free to **reach out** to instructors to talk through this process and **ask questions** whenever you feel unsure. I put together the guidelines below after reflecting on **discussions with students**.

HOW TO HAVE GREAT ACADEMIC 'TEGRITY:

- Use the provided writing guidelines for general style and specific abstract format.
- **Everyone is expected to submit assignments that reflect their and/or their partner's understanding of the material** based on the reading, lecture, discussion with instructors and peers, and personal lab experience.
- The experiment PDFs online contain most of the information you need to successfully complete assignments, with elaboration and clarification in lab and lecture. It may be necessary to look up new terms or general concepts, but otherwise *avoid searching for answers to pre- and in-lab questions online.*
- **Prevent the temptation to cheat** by working on assignments **well in advance of the due date**.
 - Ask instructors for help during lab and office hours.
 - Feel free to reach out *via email* if you need an extra day or two extension.
- *Both students in a lab pair should contribute to the remote lab, including recording observations and writing the lab report.*
 - Each student submits a **Partner Agreement & Data / Observations** at the end of each lab period.
 - TAs will confirm that work is done collaboratively and help reduce miscommunication between partners.
- Perform calculations and analysis *individually before discussing* with another student.
- Talk through the question with lab mates and instructors.
- Ask for help on **how to solve a problem** rather than asking for an answer.
- **Type all of your own work instead of copy/pasting from other sources.**
- Lab partners are encouraged to **proofread** each other's work after a draft has been completed.

WHAT TO AVOID:

- *Avoid searching for answers to pre- and in-lab questions online. This knowledge is provided in the experiment PDFs, lab lectures, and remote labs. Online sources can be problematic and often wrong!*
- Reading and posting lab reports or any other course materials on sites like CHEGG and Course Hero *violates UCSC academic integrity policy.* The same applies to using paper or electronic copies of **old lab reports**. *If someone offers you their old reports, don't accept them or give them back!* The questions and criteria change each term, making these instances relatively easy to catch.
- **Reading another group's report then rewording it is considered cheating**, as this is not reflecting your own ideas or understanding.
- Do not copy/paste from other unauthorized sources, then alter it to make it look different.
- **I recommend not emailing reports to anyone outside of your group** unless it's to proofread and you know the other group has completed their work too.

Disability Accommodation

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, **submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) using the form on Canvas** – Home Page or Quizzes, preferably within the first two weeks of the quarter. We can set up a time to meet and discuss how to ensure your full participation in the course. *This may also include **scheduling make-up labs if there are time conflicts due to extended exam times** for other courses.* We encourage all students who may benefit from learning more about DRC services to contact DRC by phone at [831-459-2089](tel:831-459-2089) or by email at drc@ucsc.edu.

Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the Campus Advocacy Resources & Education (CARE) Office by calling (831) 502-2273. In addition, Counseling & Psychological Services (CAPS) can provide confidential, counseling support, (831) 459-2628. You can also report gender discrimination directly to the University's Title IX Office, (831) 459-2462. Reports to law enforcement can be made to UCPD, (831) 459-2231 ext. 1. For emergencies call 911.

Faculty and Teaching Assistants are required under the UC Policy on Sexual Violence and Sexual Harassment to inform the Title IX Office should they become aware that you or any other student has experienced sexual violence or sexual harassment.

Land Acknowledgement

"The land on which we [would] gather [if we were meeting in person] is the unceded territory of the Awaswas-speaking Uypi Tribe. The Amah Mutsun Tribal Band, comprised of the descendants of indigenous people taken to missions Santa Cruz and San Juan Bautista during Spanish colonization of the Central Coast, is today working hard to restore traditional stewardship practices on these lands and heal from historical trauma."

Lab Conduct...Safety first!

The safety rules below do not apply to the remote labs but it's worth keeping in the syllabus ☺

- No food or drink in the lab; Wear proper attire and arrive to lab on time
- **Goggles, gloves, and lab coats** are to be properly worn when anyone is using chemicals in the lab or instrument room – points deducted for not wearing personal protective equipment (PPE)
- Pay attention to **waste procedures and chemical hazards** – table given in each experiment
- Take care of chemical spills immediately; consult the instructor
- Notify your TA of all chemical exposures; **rinse minor exposure areas with water for 15 min**
- Label all glassware before adding chemicals to it, including water
- **Clean the balance and reagent areas immediately** after obtaining chemicals every time
- Keep your work station clean; follow instructions on washing glassware - remove gloves
- **Check your results and workstation with your TA at the end of each lab**
- Foster a sense of community – ask your TA for a community cleanup task before you leave
- **ABSOLUTELY NO GLASS IN THE TRASHCANS**

Anything missing from this syllabus? Find something on Canvas that doesn't make sense for this term or link not working? I've done my best and appreciate hearing from you if anything is unclear. Please comment publicly on the most recent Canvas announcement or send me an email with more personal issues (cambinde@ucsc.edu). Thank you!

CHEM 110L Spring '23 Schedule

Friday Lab Lectures, 9:20-10:25am in Porter Acad. 144

TuWTh Labs, THIM 275

Week	Date	Lecture or Lab Topic Please read each Canvas Module Overview page	Assignment Due Canvas - details
1 LAB	TuWTh April 4-6 *1st in-person meeting*	Lab Basics & Spectroscopy Refresher Worksheet	Read Intro & Exp 1 Modules
Lecture	Fri 4/7	Exp 1 - Carbohydrates Review	Academic Integrity & GradeScope Practice
2 LAB	Mon 4/10	(Pre-Lab Quiz due)	Exp 1 Quiz Due
LAB	TuWTh April 11-13	Experiment (Exp) 1 – Carbohydrates Lab work individual or in pairs – your choice!	Exp 1 Lab Notebook
Lecture	Fri 4/14	Exp 2 - Perkin Condensation	-
3 LAB	Mon 4/17	(Pre-Lab Quiz due)	Exp 2 Quiz Due
LAB	TuWTh April 18-20	Exp 2 – Perkin Condensation: Synthesis of <i>trans</i>-Cinnamic Acid - pairs	Exp 2 Lab Notebook
Lecture	Fri 4/21	Exp 3AB – Synthesis of Phenacetin	Exp 1 Report
4 LAB	Mon 4/24	(Pre-Lab Quiz due)	Exp 3AB Quiz
LAB	TuWTh April 25-27	Exp 3AB - Conversion of Acetaminophen into Phenacetin & Analysis - solo	Exp 3AB Lab Notebook
Lecture	Fri 4/28	Exp 3C – Bromination of Phenacetin	Exp 2 Report
5 LAB	Mon 5/1	(Pre-Lab Quiz due)	Exp 3C Quiz
LAB	TuWTh May 2-4	Exp 3C - Substitution Puzzle: Bromination of Phenacetin - solo	Exp 3C Lab Notebook
Lecture	Fri 5/5  Cinco de Mayo	Exp 4 – NMR Spectroscopy – Predict Spectra & Solve Structures	Exp 3 Progress Report
6 LAB	Mon 5/8	(Pre-Lab Quiz due)	Exp 4 Quiz
LAB	TuWTh May 9-11	Exp 4 - NMR Structural Elucidation Worksheet * Required – NOT dropped *	Exp 4 NMR, Part 1
Lecture	Fri 5/12	Exp 5A – Pseudoionone Synthesis	Exp 3 Report
LAB	TuWTh May 16-18	Exp 5A - Synthesis of Ionones, Part 1: Aldol Condensation - pairs	Exp 5A notebook
Lecture	Fri 5/19	Exp 5B – Ionone Synthesis	Exp 4 NMR, Part 2
8 LAB	Mon 5/22	(Pre-Lab Quiz due)	Exp 5 quiz
LAB	TuWTh May 23-25	Exp 5B - Synthesis of Ionones, Part 2: Cyclization - pairs	Exp 5B notebook
Lecture	Fri 5/26	Exp 6 – Diels-Alder [4+2] Cycloaddition	-
9 LAB	Tues 5/30	(Pre-Lab Quiz due)	Exp 6 quiz
LAB	TuWTh May 30 – June 1 	Exp 6 - Diels-Alder Reaction - pairs	Exp 6 notebook
Lecture	Fri 6/2	Exp 7 – Synthesis of Biodiesel	Exp 5 report
10 LAB	Mon 6/5	(Pre-Lab Quiz due)	Exp 7 quiz
LAB	TuWTh June 6-8	Exp 7 - Synthesis of Biodiesel Lab work individual or in pairs – your choice! * Required – NOT dropped *	Exp 7 notebook
Lecture	Fri 6/9	Class Wrap-up, Loose Ends, Q&A	Exp 6 Report
11	Mon 6/12	Exp 7 report due Monday, June 12th	

