

## CHEM 8M – Organic Chemistry Lab II

🌹 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 responsible for 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). Begin your ochem journey to learn the behind-the-scenes magic that make life possible!

**Instructor:** Caitlin Binder, Ph.D.

**Email:** [cambinde@ucsc.edu](mailto:cambinde@ucsc.edu)

**Lab Lectures:** MW 1-2:30pm, Zoom

**Office Hours:** Mondays & Wednesdays 2:30-3pm, after lab lecture and Fridays 1-2pm via Zoom

### Teaching Team & Lab Sections – office hours on Canvas

Emma Coester, <a href="mailto:ecoester@ucsc.edu">ecoester@ucsc.edu</a>	Jax Maya, <a href="mailto:jimaya@ucsc.edu">jimaya@ucsc.edu</a>	Cambell Conour, <a href="mailto:cconour@ucsc.edu">cconour@ucsc.edu</a>
Elizabeth Pearson, <a href="mailto:eswinn@ucsc.edu">eswinn@ucsc.edu</a>	Gilbert Carpenter, <a href="mailto:gocarpen@ucsc.edu">gocarpen@ucsc.edu</a>	Roby Jenkins – stockroom support, <a href="mailto:rojenkin@ucsc.edu">rojenkin@ucsc.edu</a>

**Course Description:** CHEM 8M (2 units) builds on the isolation and purification techniques learned in 8L, including liquid-liquid extraction, chromatography, and distillation. Synthetic organic chemistry is a broad and exciting field that requires careful analysis of compounds, many of which are clear liquids and white solids (maybe not so exciting color-wise!). Students will become proficient in compound characterization *via* thin-layer chromatography (TLC), infrared (IR) spectroscopy, and nuclear magnetic resonance (NMR) spectroscopy. Proper technical writing is emphasized.

**Prerequisites:** CHEM 8L and previous or concurrent enrollment in 8B

### Materials & Tools – organized by Module in Canvas: [canvas.ucsc.edu](https://canvas.ucsc.edu); Schedule on next page

- Lecture note templates – print, download, or copy by hand before Friday classes
  - Lecture recordings and Caitlin's notes will be posted on Canvas
- Lab PDFs – background reading, procedure, pre-lab questions, and lab report details for each experiment
  - **GradeScope**: online tool to upload lab reports and get detailed feedback; linked in Canvas
- **Slugs@Home** Lab Previews: <https://sites.google.com/ucsc.edu/slughome/home>
- 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 – wear at all times during lab & cleanup**
  - **Masks** are worn in the lab at all times.
- *Optional textbook*: Mohrig, J. R.; *et. al.* "Techniques in Organic Chemistry, 4<sup>th</sup> Edition" Freeman, 2015
  - Using an older edition? Refer to lecture titles in the schedule for background reading

### Attendance Policies

- Summer 8L is offered at an accelerated pace. Use the schedule and Canvas to stay on track.
- **Zoom links** to MW lab lecture and online office hours are on Canvas.
  - Lectures are **synchronous** - live attendance advised and appreciated, not required
    - Lectures are recorded & posted on Canvas – may take up to 4 hours, join live to stay involved!
- Required in-person labs start **Tuesday, July 26<sup>th</sup> at 11:30am** for safety scavenger hunt & lab basics activities
  - **Check SAFETY RULES** for what's OK and NOT OK to wear – no shorts, sandals, tank tops, or leggings
- Lab Attendance
  - Please arrive early; email your TA if you'll be 10+ minutes late, otherwise it may count as a missed lab
  - Participation credit is given for uploading your digitized notebook pages after lab
  - Everyone gets **one excused lab day – all reports & notebook pages required to pass the course**
    - Sorry but we are NOT offering extended remote accommodations beyond the one
  - One remote makeup lab is offered for each lab on the following day (ex. Tues lab makeups are on Wed afternoon) – live Zoom session with TA to go through the Slugs@home website with a partner.
    - Email your TA and Caitlin if you miss lab so we can coordinate the best time for a makeup

## UCSC CHEM 8M Summer '22 Schedule

**MW 1 – 2:30pm = lab lecture** via Zoom, *plz join live!*

- Lectures recorded ... posted on Canvas / YuJa 4-5hrs after class

**TuTh 11:30am – 3:30pm = in-person labs** in THIM 249 – 275

Wk	Date	Topic	Due 11:59pm - Canvas
1	M 7/25 ZOOM	<b>Experiment 1 - Column (Liquid) Chromatography</b>	
	Tu 7/26 LAB	<b>First in-person meeting, attendance required Meet &amp; Greet ... Lab Basics Activity</b>	Lab Basics
	W 7/27 ZOOM	Exp 1 - Column Chromatography Exp 2 - Acid-Base Extraction	Exp 1 Quiz
	Th 7/28 LAB	<b>Exp 1: Column Separation of Excedrin</b>	Exp 1 Notebook
	F 7/29	1-2pm Open Q&A session with Caitlin B - Zoom	
2	M 8/1 ZOOM	Excedrin Analysis and acid-base extraction	Exp 1 report
	Tu 8/2 LAB	<b>Exp 2 - Acid-Base Extraction of Excedrin</b>	Exp 2 Notebook Prep
	W 8/3 ZOOM	Exp 0 - Proton Nuclear Magnetic Resonance ( <sup>1</sup> H NMR)	Exp 2 Quiz
	Th 8/4 LAB	<b>Exp 2 - Acid-Base Extraction of Excedrin</b>	Exp 2 Notebook
	F 8/5	1-2pm Open Q&A session with Caitlin B - Zoom	Exp 2 report
3	M 8/8 ZOOM	Exp 0 - <sup>1</sup> H NMR Analysis Exp 3 - Oxidation of Benzhydrol	Exp 0 Quiz
	Tu 8/9 LAB	<b>Exp 0 – <sup>1</sup>H NMR Worksheet</b>	Exp 0 – NMR Worksheet
	W 8/10 ZOOM	Exp 3 – Benzhydrol Analysis Exp 4 – Esterification – Synthesis of Fruity Fragrances	Exp 3 quiz
	Th 8/11 LAB	<b>Exp 3 - Oxidation of Benzhydrol</b>	Exp 3 notebook
	F 8/12	1-2pm Open Q&A session with Caitlin B - Zoom	
4	M 8/15 ZOOM	Exp 4 – Fruity Fragrances Analysis	Exp 3 report
	Tu 8/16 LAB	<b>Exp 4 - Fruity Fragrances – synthesis</b>	Exp 4 notebook prep
	W 8/17 ZOOM	Exp 5 – Aspirin Synthesis	Exp 4 quiz
	Th 8/18 LAB	<b>Exp 4 - Fruity Fragrances – purification &amp; analysis</b>	Exp 4 notebook
	F 8/19	1-2pm Open Q&A session with Caitlin B - Zoom	Exp 4 report
5	M 8/22 ZOOM	Exp 5 – Aspirin Analysis	Exp 5 quiz
	Tu 8/23 LAB	<b>Exp 5 - Synthesis of Aspirin</b>	Exp 5 notebook
	W 8/24 ZOOM	Exp 5 Post-Lab	
	Th 8/25 LAB	<b>TA office hours via Zoom</b> 1-2pm Open Q&A session with Caitlin B - Zoom	Exp 5 report
	F 8/26	-	

## Assignments & Policies

**Introductory assignments** to familiarize yourself with tools & resources – see Canvas

Required Week 1 - 10% of course grade	Optional – encouraged for community!
<ul style="list-style-type: none"><li>• GradeScope Test Assignment</li><li>• Academic Integrity / Honor Code</li><li>• Lab Basics &amp; Safety Scavenger Hunt</li></ul>	<ul style="list-style-type: none"><li>• Survey &amp; Collaborative Spotify Playlist</li><li>• Cool Chemistry Apps</li></ul>

*Experiments and **three (3) associated assignments** are organized in Canvas Modules*

### Before Lab

- Read the **lab PDF** and/or listen to the **podcast**
- Attend **lecture** while filling in **class note** templates
- Preview the lab on **Slugs@home** and watch the conceptual **pre-lab videos** on Canvas
- Prepare for the pre-lab quiz: complete the **pre-lab questions** in the lab PDF, lab lecture helps ☺
- Open the **worksheet** – use as template for preparing **notebook pages** – see next page for help
- Take **pre-lab quiz** before lab – check Canvas for due date

### During Lab

- Arrive ~5 minutes early, show prepared notebook pages to your TA
- **Check-ins, Pre-lab talk, Q&A**
- Perform the **lab** with a partner as you enter data & observations in your notebook
- **In-lab questions** are discussed as a group, along with any other Q&A.
- Take pictures of completed **notebook pages** and upload as soon as you can after lab

### After lab

- Submit the **lab report** on GradeScope, due a few days after experiment – check Canvas for due date

## POLICIES

- All **notebook pages** and **lab reports** must be turned in for all experiments to complete & pass the course.
- The lowest **quiz, notebook, & report** scores are automatically dropped on Canvas (one from each group).
  - Note: the Exp 0 - **NMR Worksheet** is required – NOT dropped
- **Due dates** are on Canvas – do your best to plan ahead during this accelerated summer schedule!
- *We'll help if we can!* Email your TA before the due date for a day or two **extension** on any assignments.
  - Everyone gets **one lab late report** (2 days) – email PDF to your TA, they'll upload to GradeScope for you
  - Note: Canvas automatically enters a '0' on late assignments until they're graded.
- Email your TA (cc Caitlin) ASAP if you have **any issues** with attendance, submitting assignments, etc.
- Incorporate **feedback** from graded reports into future assignments.
  - Instructions for reviewing feedback on assignments – Intro Module – GradeScope Guides for Students.
  - Your TA is happy to *discuss* any grading questions or concerns in a kind & compassionate manner.
  - Submit brief **regrade requests** directly in GradeScope – instructions on Canvas.

## 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).**

Lab Notebook Preparation – *Required before lab; worksheet provided as suggested template on Canvas*

- **Purpose:** one-sentence summary of the main lab goals plus the recrystallization scheme (**Figure 2**).
- **Reagent Table** – add chemical properties; Wikipedia is a reliable source for chemical info!
- **Procedure with Diagrams** – **complete before starting lab; sample on Canvas**
  - Use the procedure that follows to create your hand-drawn experimental instructions
    - Simple sketches & labels for **all equipment, chemical names with amounts, & transfers**
  - Format: Break it up with flow charts, bullet-points, comic strip, and/or whatever works for you!
    - Avoid copying the procedure word-for-word.
    - Make it easy for anyone to follow your procedure without referring to this document.
- **Slugs@home Exp 1 website** - Equipment & Safety pages; pictures & videos of the whole lab
- The **class notes** include useful diagrams as well

### Lab Conduct...Safety first!

The complete SAFETY RULES are posted on Canvas and will be reviewed on the first day of lab ☺ Highlights...

- 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**

## AFTER: Lab Reports

All reports include responses to **in-lab questions**. Starting Exp 3, reports also include ‘**experimental methods**,’ a *very abbreviated form of the procedure and results* described in the writing guidelines and Exp 3 worksheet!

Reports are completed **individually (Exp 1-3)** with the *option* to complete Exp 4-5 reports with a partner. You’re encouraged to discuss material and results with your partner – please see the Academic Integrity guidelines for advice on how to still turn in an individual report.

**Partner reports (Exp 4-5):** Discuss the report during lab and who will type which parts of the report. It is OK to do these reports individually if your schedules don’t work. 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!!

***Get help with your assignments, ideally during lab or at least several days before the due date!***

### IN-LAB QUESTIONS – SEE LAST PAGE OF EACH LAB PDF

- 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.
- *Makeup remote labs only:* Randomized data is provided by the TA or within the remote lab itself.

### EXPERIMENTAL DETAILS AND CHARACTERIZATION

- This section applies to Exp’s 3-5 reports. No experimental section in Exp’s 1-2 reports.
- Use the writing guidelines on Canvas and specific notes in each lab PDF
- The Experiment 3 worksheet includes steps on how to write your first experimental methods section!

### **Neatness & Organization**

- Refer to report guidelines above, in the experiment handout, and the writing guidelines.
- This includes spelling, grammar, format, and overall clarity.

### **Strict 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 – 77.99%
D 55.0 – 69.99%		F < 55.0%

**Complete the Academic Integrity / Honor Code 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. In Exp 4-5, discuss the **Partner Agreement** in lab to determine how you'll work together to complete the report. 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, lab notebook pages, and Exp 1-3 lab reports
- **Pairs:** Exp 4-5 lab reports, option to work individually

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 consequence and Caitlin's least favorite part of her job. It's better to get no credit than to have a report filed.

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 in the lab, including recording observations and data*
  - Each student submits **Notebook Pages** at the end of each lab period.
- 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](mailto: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 gather 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.”