

**CHEM 8L – Organic Chemistry I Lab**

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**Office Hours** - vary by week; announced in lecture & on Canvas schedule

**Teaching Assistants** – email addresses [@ucsc.edu](mailto:@ucsc.edu); office hours announced in lab & posted online

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**Course Description:** CHEM 8L (2 units, formerly 108L) is an introduction to common methods in synthetic organic chemistry, as it applies to pharmaceutical and research industries. Students learn basic techniques for isolation and purification of organic chemicals, as well as qualitative and quantitative analysis. These fundamental skills will be applied in organic reactions. Students learn to perform lab work in a safe and efficient manner. Technical writing is incorporated into lab reports and abstracts.

**Prerequisites:** CHEM 1C and 1N and previous or concurrent enrollment in 8A.

**Course Materials**

- **Website:** <https://acrochem.sites.ucsc.edu/chem-108l/>
- Lecture blanks are templates for note-taking – bring to every class; these can be purchased together at the bookstore (reader), printed, or downloaded onto tablet from the website above.
- Lab Notebook with duplicate pages
- Shared goggles and lab coats provided for students in the lab
- Optional textbook: Mohrig, J. R.; et. al. "Techniques in Organic Chemistry, 4<sup>th</sup> Edition" Freeman, 2015 (other editions acceptable, use lecture titles for reading assignments)

**Lecture webcasts** at [webcast.ucsc.edu](http://webcast.ucsc.edu). Username - listed next to class. **Password:** [@croCh3m](mailto:@croCh3m)

**Course Policies** – see page 6 for more detail

- Enrolled students must be present and properly dressed at all lab meetings (**dress code** in SAFETY RULES online). If you are more than **15 minutes** late for the first lab or improperly dressed, **you will be dropped from the course**.
- Attendance to lab lecture is mandatory. **No make-up quizzes.** You are responsible for getting the notes from another student and/or watching the webcast if you miss lecture. I do not give out lecture notes. Webcasts are not intended as a regular lecture substitute – come to class!
- There will be **no section switching** after the first lab meeting.
- Starting the second meeting of lab, if you are more than **two minutes late**, you cannot take the pre-lab quiz. If you are more than **five minutes late**, you cannot participate in that lab (see p 6).
- Attend every lab during your enrolled section. There are no make-up labs in the summer. If you have a reasonable excuse to miss lab, email me and cc your TA **before your lab starts** (see p 6 for details).
- If you miss or come to lab late, unprepared, or are asked to leave the lab for violating any safety rules (including dress code), you are **may be eligible for partial credit**. Communicate with me or the TA **before the end of lab** or this offer expires, no exceptions (see p 6).
- Consult the schedule for experiment due dates. Assume **no late lab reports** will be accepted unless **permission is given by your TA before the due date**.
- *If you do not turn in 2 reports or are not present 2 lab days for any reason, you cannot pass the course.*

**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) to me by email, 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, including **accommodations for the lab practical exam**. 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).

## Academic Integrity

[https://www.ue.ucsc.edu/academic\\_integrity](https://www.ue.ucsc.edu/academic_integrity)

Students work in pairs for most labs and are encouraged to discuss experiments with each other, but *each student turns in an individual report. Zero points will be assigned to duplicate lab reports, or sections of lab reports that are obviously copied, at the TA's discretion.* Such incidents will be reported to the UCSC Academic Misconduct office.

**I acknowledge that you may not understand how to work in a lab partnership but turn in an individual report.** I put together the guidelines below after reflecting on **discussions with students**. 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.

### HOW TO:

- **Every student is expected to submit individual assignments reflecting that student'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, but otherwise avoid searching for answers to pre- and post-lab questions online.
- **Prevent the temptation to cheat** by working on assignments **well in advance of the due date** and ask instructors for help during lab and office hours.
- *Both students in a lab pair should perform roughly the same amount of hands-on lab work.* If a TA finds only one student is performing the lab out of a pair, a warning will be issued. **A second offense will result in dismissal from the lab and possibly from the course.**
- Record raw data individually, rather than copying from a lab partner. Instructors will discuss what is considered 'raw data' but please ask if it is not clear.
- 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.
- Abstracts are to be completed individually using the provided guidelines.
- **Type all of your own work!**
- Lab partners are encouraged to **proofread** each other's work after a draft has been completed.

### WHAT TO AVOID:

- Reading and posting lab reports or any other course materials on sites like 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 and/or give them back!*
- Do not share data with a student that did not perform the lab.
- Do not work on a lab report by **splitting up the questions then copying each other's work**.
- Reading someone else's report then rewording it is considered cheating, as this is not reflecting your own ideas or understanding.
- Do not copy/paste someone's work then alter it to make it look different.
- **I recommend not emailing reports to each other** unless it's to proofread and you know the other student has completed their work too.

## Lab Conduct

### **Safety first!**

With more advanced labs comes the responsibility of potentially dangerous chemicals and procedures. Students are expected to act responsibly in lab and abide by all of the **SAFETY RULES posted online**, including but not limited to the points below. **Violations are taken very seriously – point penalties, dismissal from lab, or dismissal from the course (D)**.

- 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**

## Lecture Etiquette

*Let's all treat each other respectfully!*

Attendance to every lecture is mandatory and necessary for successful completion of this course. A lecture will be given on each experiment to aid in your preparation and understanding of the principles behind each lab. Attendance quizzes will be given in lecture periodically (no make-ups, no exceptions).

\* Friday's lectures cover lab material for the following week. Stick to the reading schedule to stay engaged in class. ***It is recommended that students have as much of the notebook and pre-lab questions prepared as possible before lecture to aid in comprehension.***

\* **Webcasts:** audio and anything projected in lecture will be posted online. The webcasts are intended to allow students to review material, supplement lecture notes, and help with reports. ***This should not be a regular substitute for lecture,*** as you are far more likely to engage in the material in person and are able to ask questions. Also, it may take several days after lecture for the webcasts to be available online.

\* You are responsible for the material if you miss lecture – get notes from a classmate and/or watch the webcast. I do not give out lecture notes.

\* You are welcome to ask questions in lecture. It's more fun that way! Otherwise, no talking during class.

\* Come to class on-time, stay for the duration. **Please wait to pack up until I have dismissed the class.**

\* **CELL PHONES OFF AND AWAY! Do not take pictures or video in class. I am not comfortable with this and you do not have my consent unless I say otherwise in class** (remember, the webcasts are available a few days after class). Please write notes by hand.

\* ***Tablets are great but laptops are less useful for note-taking.*** Ask permission to use other electronic note-taking devices or I will ask you to put it away during class, as this can be distracting. Thank you!

### Pre-Lab Preparation

**Arrive to every lab on time and properly dressed, even if no experiment is performed that day. On wet lab days, have your prepared lab notebook and typed pre-lab questions per the guidelines below.** Experiments PDFs containing specific notebook requirements and pre-lab questions are posted online. You cannot refer to lab PDF's in lab unless otherwise instructed.

**PRE-LAB QUIZ** – There will be a short quiz at the beginning of lab to assess your preparation. If you read the lab handout and put thought into the pre-lab questions, this should be quick and easy! If you are 2+ minutes late to lab, you cannot take the quiz - no exceptions.

**LAB NOTEBOOK:** Use a notebook with duplicate pages. It's ok to use a notebook from a previous class. Write in pen (no pencil). If you make a mistake, use a single-line strike-through (no scribbles), NO WHITE-OUT! You're welcome to use / copy the *sample notebook page* online.

**Be prepared, no surprises!** Your **TA will check your lab notebook before you enter the lab**. **You cannot stay to perform the lab and are not eligible for a make-up if your notebook is not properly prepared with each of the following** (see page 5 for partial credit potential for incomplete notebooks).

- Experiment Number, Title, Your Name, Lab Partner Name, Date, Section Day/Time
- **Purpose** – one sentence plus scheme with structures & abbreviations
- **Reagent Table – must be complete before lab for entry**
  - For each chemical used, make a table with its chemical name, molecular mass, moles used (mmol), mass or volume used (mg or mL), molar equivalents (for reactions only) bp/mp, density, and relevant **hazards** (flammable, corrosive, lachrymator, pyrophoric, hygroscopic, etc.) The hazards are listed in the safety tables at the end of each handout and chemical properties can be found at [www.sigmaaldrich.com](http://www.sigmaaldrich.com).
- Full hand-written, step-by-step **procedure with diagrams**.
  - DO NOT copy directly from the handouts. This should be in your own words.
  - Use concise, bullet points phrases in the procedure in any format that will be useful to you or a lab mate in easily following your own instructions in the lab.
  - Include diagrams of glassware, especially if it's new to you, and/or some type of flow chart that complements your written procedure. This is not a substitute for the hand-written procedure.
- **Waste and Clean-up Notes.** Copy the table in the lab PDF and announcements in lecture/lab.

### INTRODUCTION (PRE-LAB QUESTIONS)

- Include a header at the top of the page with your name, section letter, day, time, and room number. A title should appear as well, such as "Exp 1 Introduction".
- **Responses to pre-lab questions** are to be numbered, written in complete sentences, typed, printed, and handed in to your TA at the very beginning of the lab period (as you walk in the door). Your TA will return these to you the day the report is due.
- DO NOT re-type the question exactly but DO re-word the question as part of your answer.
- You may leave space to hand-write structures, mechanisms, calculations, etc. in PEN. Responses in pencil will not be graded.
- **Do not wait until the last minute to print this out.** *This is your only opportunity to get credit for the pre-lab questions - no exceptions for printer issues, etc.*
- The pre-lab questions will not be graded if the TA's initials are not present, or other type of TA notation for approval. Altering pre-lab questions after turning them in would qualify as academic dishonesty and you will receive zero points for that section of the lab report. A second infraction will not be tolerated (see section on Academic Integrity above).
- **Get help with your introduction before it is due!**

### **Lab Reports (70%)**

Reports are due at the beginning of lab on the due date (see schedule). Reports should be **typed** with the exception of notebook pages, figures, structures, mechanisms, and calculations. The format outlined below should be used along with **writing guidelines** provided on the first day of lab (posted online too).

Your TA may have specific instructions or expectations. Please pay attention to in-class announcements.

***Get help with your assignments, ideally during lab or at least several days in advance!***

- **Introduction** - original pre-lab responses with TA initials, see description on previous page
  - You may leave space to hand-write calculations, structures, and mechanisms.
  - DO NOT copy/paste structures from web sources or the experiment PDF.
  - Tables should be given clear labels (**Table 1**, etc.) and a descriptive title.
- **Results** – Typed, numbered responses to in-lab questions in complete sentences
  - You may leave space to hand-write calculations, structures, and mechanisms.
  - DO NOT copy/paste structures from web sources or the experiment PDF.
  - Tables should be given clear labels (**Table 1**, etc.) and a descriptive title.
- **Abstract**
  - Use the writing guidelines (Part C) and specific notes in the experiment PDF
  - 4-6 sentences: purpose, methods, main result(s), and conclusions.
  - Day 4 of lab includes an activity on how to write the Exp 2 abstract
  - Grading rubric at the end of each experiment PDF indicates whether an abstract is required.
- **Lab Notebook Pages**
  - Tear out the carbon-copy pages from your notebook for that lab and attach to the lab report. DO NOT re-write or alter your notebook pages once the lab is completed, except to complete calculations or analysis.
  - Get your TA's permission to leave lab – show your completed data, analysis, and cleanup.
- **Pre-Lab Quiz, Neatness, & Organization**, 10-20% of each report.
  - Refer to report guidelines in the syllabus, experiment handout, and writing guidelines.
  - This includes spelling, grammar, format, and overall clarity.
- **Lab Technique**, 5-10% of each report
  - Students are expected to safely and responsibly carry out experiments using proper techniques as described in the safety rules (online), experiments posted online, and any other demonstrations or instructions given by TAs in lab. **Ask for help when unsure!**
  - Students must check out with the TA for a notebook and cleanup check before leaving every lab, otherwise zero points are awarded for this section.
  - All equipment in the drawer becomes the assigned student's responsibility, whether or not they use it that quarter. Students are given time after three labs to clean their equipment drawer. Equipment lists are provided in the lab. Physically pick up each item to make sure it is clean & intact (not dirty and/or broken).
  - **Any student who leaves a drawer with missing, extra, broken, or dirty items at the end of the term will be dropped a full letter grade.**

### **Lab Practical Exam (30%)**

- Each student will perform this experiment individually using the prepared lab notebook in 1 hr, 45 min without help from classmates or the TA (no talking).
- Your lab practical time will be assigned one-to-two weeks before the exam as either the *first or second half of your regular 4-hour lab time*. *You will get a zero for the exam if you miss your time.*
- Students prepare for the lab practical (Exp 6) just like any other (notebook & pre-lab questions). The experiment will be discussed in the last lecture and full experiment details are available online.

### Assignments Overview

- \* Read **lab handouts** before lecture and to prepare for lab.
  - \* Prepare your **lab notebook** and **pre-lab questions** before each lab.
  - \* Be prepared for a short **pre-lab quiz** at the beginning of every lab.
  - \* Five individual **lab reports** (see due dates on schedule).
  - \* **Lab Practical Exam** assessing student's ability to complete an experiment & analysis.
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### Grade Breakdown

- (20 points, 2%) **Safety Orientation, Writing, & Error Analysis Activities**  
(30 points, 3%) **Lecture Quizzes** – must be present for credit, no exceptions  
(700 points, 65%) **Lab Reports**  
(250 points, 30%) **Final Lab Practical Exam** – Week 10
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### Grading Policies

- \* **Students are to keep a record of their own graded assignments (no grades on Canvas).** Incorporate feedback from graded reports into future assignments. Your TA is happy to *discuss* any grading concerns within one week after graded work is returned.
- \* **Students must perform all labs and turn in all lab reports.**
  - \* One missed lab = 10% of overall course grade is lost, meeting half-way policy may apply (see below)
  - \* Missing two lab periods = grade is dropped to a D and student will have to re-take the course.
- \* **The following conditions will keep students from performing the lab...**
  - \* Arriving to lab unprepared, including missing notebook components and improper attire
  - \* Arriving to lab more than 5 minutes late
  - \* Not abiding by safety rules, procedures, or TA instructions

#### **Missed Lab Policy - This offer expires 2 minutes after your lab section starts!**

- There are no makeup labs available, as all lab sections run at the same time.
- Do not come to lab if you are sick. **Students are permitted one missed lab with reasonable excuse without penalty if we are notified before the lab starts and turn in pre-lab questions, notebook pages, and report due: Email Caitlin & your TA to let us know your situation.**
  - Pre-lab questions and notebook pages will be graded. This lower report score will be dropped at the end of the quarter, once we confirm this is the only experiment missed. You are welcome to complete other parts of the report for feedback but will not get credit.
  - If the pre-lab and notebook pages are not turned in within the time frame in our email reply, the student receives zero points for that report.
- Students who miss two lab periods for any reason cannot pass the class.

#### **"Meeting Half Way" Policy = you are 5+ min late, missed lab, or are not prepared AND do not contact us before your lab starts... and complete the following for partial credit on the report.**

- If possible, go to lab before it ends to **turn in your introduction, notebook pages, and report**.
- If you cannot physically come to lab, send us (Dr. B & your TA) an email to make arrangements to turn in the introduction and at least show completed notebook pages to your TA ASAP.
- **Leave your lab report in your TAs mailbox in PSB** if one is due the day you missed.
- Turn in the grading rubric the following week in lab at the very latest along with the intro and notebook pages (roughly 50% of the report is better than 0%!). You are welcome to complete other parts of the report for feedback but will not get credit. **This report score will not be dropped.**
- ***This offer expires the minute your lab is over!***

**Students who miss lab and follow the meeting half way policy are still eligible for an A in the course, provided the rest of the reports have excellent scores. You only get one of these!**

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**LECTURE AND LAB SCHEDULE**

<b>Week</b>	<b>Lecture Topic, Mon &amp; Wed*</b> <i>Additional Reading - Mohrig 4<sup>th</sup> ed.</i>	<b>Labs, Tu &amp; Th</b> <i>Experiments Online</i>
<i>The Mohrig assignments are from an optional textbook for supplemental reading on lab techniques. Relevant material is presented in abbreviated form in experiment PDFs online and in lecture.</i>		
1	<b>6/24 - Recrystallization</b> <i>Exp 1; Chapters 9 &amp; 15</i>	6/25 - First Lab Meeting <b>Mandatory check-in</b> Safety, Writing, & Error Analysis
	<b>6/26 – % Recovery, Melting Points; Distillation</b> <i>Exps 1&amp;2; Chapter 12 (12.2a) &amp; 14</i>	6/27 – pairs <b>Exp 1 - Recrystallization of Acetanilide</b> <u>Due 7/2</u>
2	<b>7/1 – Gas Chromatography</b> <i>Exp 2; Chapter 20</i>	7/2 – pairs <b>Exp 2 - Citrus Oil (Distillation)</b> **BYO Grated, Fragrant Citrus Peels** <u>Due 7/12 by 5pm in TA Mailbox ***</u>
	<b>7/3 – No Lecture</b>	<b>7/4 – Happy 4<sup>th</sup> of July! No Lab</b>
3	<b>7/8 – Liquid-Liquid Extraction</b> <i>Exp 3; Chapters 9-11</i>	7/9 - pairs <b>Exp 2 - Citrus Oil (GC Analysis)</b> <u>Due 7/12 by 5pm in TA Mailbox ***</u>
	<b>7/10 – Thin-Layer Chromatography (TLC); Infrared (IR) Spectroscopy Intro</b> <i>Exp 4; Chapters 18.1-18.6 &amp; 21.1-21.2</i>	7/11 - solo <b>Exp 3 - Spinach/TLC</b> Spinach Provided <u>Due 7/16</u>
4	<b>7/15 – IR; Elimination Reactions</b> <i>Exp 5; Chapter 21.7-21.9</i> <i>Also McMurry** 7.9, 11.7-11.10, 17.6</i>	7/16 – pairs <b>Exp 4 - IR Exercise</b> <u>Due in 7/19 by 5pm in TA Mailbox ***</u>
	<b>7/17 – Elimination &amp; Substitution Reactions</b> <i>Exp 6; Chapter 5.3, 6.1, 7.1</i> <i>Also McMurry* Chapter 11</i>	7/18 - solo <b>Exp 5 - Dehydration of Methylcyclohexanols</b> <u>Due 7/25</u>
5	<b>7/22 – Substitution Reactions; Lab Practical Details</b> <i>Exp 6; Chapter 5.3, 6.1, 7.1</i> <i>Also McMurry* Chapter 11</i>	<b>7/23 - LAB PRACTICAL EXAM - solo</b> <b>Exp 6 - Synthesis of t-pentyl chloride</b> <u>Due at the end of lab</u>
	<b>7/24 – No Lecture</b>	<b>7/25 – Turn in Exp 5 report to TA mailbox; no lab</b>

\* Experiments may be described in lecture up to a week before the lab is performed. Stick to the reading schedule to stay engaged in lecture.

\*\*McMurry's Organic Chemistry, 8<sup>th</sup> Edition (8A text) – supplemental reading on organic reactions

\*\*\* TA mailboxes are on the 2<sup>nd</sup> floor of PSB – in between rooms 230 & 240

**Strict Grade Distribution**

A+ 98.0 – 100%	A 93.0 – 97.9%	A- 90.0 – 92.9%
B+ 88.0 – 89.9%	B 83.0 – 87.8%	B- 80.0 – 82.9%
C+ 78.0 – 79.9%		C 70.0 – 77.9%
D 55.0 – 69.9%		F < 55.0%