



**Oregon State
University**

Chemistry 362/362H: Experimental Chemistry I Winter 2021

Course syllabus

Welcome to Chemistry 362! This is the second term of the integrated laboratory program for chemistry majors highlighting techniques in organic, physical, inorganic and analytical chemistry. First-hand experience is gained using specialized glassware, scientific equipment and instrumentation and computers. Essential technical laboratory standards and technical writing are emphasized. This course is restricted to chemistry and biochemistry/biophysics majors.

Instructors	Professor Kevin Gable	Dr. Amila Liyanage	Dr. Neal Sleszynski
	Gilbert 234 (Office)	Gilbert 349 (Office)	Gilbert 231 (Office)
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Per university policy and federal law (FERPA) emails must be sent from your ONID email address

Office Hours Dr. Gable: By appointment on Zoom (please see Dr. Gable's calendar at <https://sites.science.oregonstate.edu/~gablek/calendar.htm> for available time slots)

Dr. Liyanage: By appointment on Zoom.

Dr. Sleszynski: By appointment.

Instructors are also available for questions during lab sessions.

Teaching Assistants (TA's)	Mr. Yang Cao (caoyan@oregonstate.edu)	Mr. Blaik Hopewell (hopewelb@oregonstate.edu)
	Mr. Omar Farah (farahab@oregonstate.edu)	Ms. Ashley Kirsch (kirschas@oregonstate.edu)
	Mr. Patrick Dey (deyp@oregonstate.edu)	Mr. Gary Points (gary.points@oregonstate.edu)
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	Mr. Joe Harper (harpejor@oregonstate.edu)	Mr. Steven Tran (trans2@oregonstate.edu)

TA's do not hold office hours, but they are available for questions during lab sessions.

Prerequisites One full year of general chemistry with laboratory, and CH 361 or a transfer equivalent

Co-requisites CH 335

Course Structure CH 362 comprises lecture and laboratory components:

Lecture: Monday, 4-4:50 p.m. on Zoom (see Canvas for the link)

Laboratory: Tuesday and Thursday 8:00 am – 11:20 am on Zoom (Section 010) (See Canvas for the link)

Tuesday and Thursday 1:00 – 4:20 pm in GbAd 209 and 409 (Section 011)

Wednesday and Friday noon – 3:20 pm in GbAd 209 and 409 (Section 012)

Course Materials Techniques in Organic Chemistry by Mohrig, Hammond & Schatz (3rd or 4th edition) – required
CH 362 Laboratory Manual – required

A 100-page laboratory notebook with carbon copy pages – required

Lab coat (available for purchase during lab check-in) – required

Safety goggles (available for purchase during lab check-in) – required

Experiments in Physical Chemistry by Shoemaker, Garland & Nibler – optional

An open access statistics textbook may be accessed using the following link:

<https://open.umn.edu/opentextbooks/textbooks/135>

Course Schedule Please refer to Canvas and/or the CH 362 course website for a detailed schedule of lecture topics and lab activities: <https://chemistry.oregonstate.edu/content/ch-362362h-experimental-chemistry-1>

Learning Outcomes Please refer to the CH 362 course website for a description of student learning outcomes.

Assignments	Pre-labs (10 points each, 8 total)	80 points
	Laboratory Notebook (5 points each, 10 total)	50 points
	Laboratory Technique	100 points
	Lab Report #1	150 points + 50 pts for Peer Review
	Lab Report #2	150 points
	Lab Report #3	100 points
Oral Presentation (NMR unknown)	50 points	

Grading Course letter grades will be assigned based on the total points earned. The approximate cut-offs are as follows:

90% (A), 80% (B), 70% (C), 60% (D), <60% (F). Plus/minus grades will be assigned as well. At the discretion of the course instructors, letter grades may be assigned based on percentages that are lower than these listed.

- Prelab Assignments** Eight prelab assignments will be administered. These short assignments are designed to measure your preparedness to perform laboratory activities. Students may not enter the lab without satisfactory completion of the prelab assignment. Please see the course schedule for a list of prelab due dates.
- Lab Notebooks** For in-person sections, TAs will collect the laboratory notebook carbon copies at the end of each lab session. A OneNote notebook administered through Canvas will be used for all remote lab work. Please refer to the CH 362 laboratory manual for guidance on maintaining a proper lab notebook.
- Laboratory Technique, Engagement and Participation** Demonstration of safe and effective lab procedures is an essential element of CH 362. Components of lab technique include, but are not limited to, the following: being prepared for lab; carrying out experimental procedures in a safe and organized fashion; following lab safety procedures, which includes dressing appropriately and wearing safety goggles; arriving promptly to each lab session; finishing experimental work in a timely fashion. Participation and engagement in remote activities will be measured by initiation of, and response to, discussion of the lab activities. Teamwork on partnered activity will also be assessed.
- Lab Reports** Three formal lab reports will be submitted, according to the due dates listed below. For more specific information about each lab report's requirements, please refer to the CH 362 course website and the CH 362 lab manual. A 10 point per day deduction will be applied to unexcused late lab reports.
- Lab report #1: Due by 11:59 pm, Monday, February 8
 Lab report #2: Due by 11:59 pm, Monday, March 1
 Lab report #3: Due by 5:00 PM, Wednesday, March 17
- Peer Review** Done via Canvas, due 11:59 pm, Monday, February 15.
- Oral Presentation** A 5-minute presentation on identifying an unknown from NMR and mass spectra. On Zoom, March 11/12.
- Incomplete (I) Grades** Requests for incomplete (I) grades are evaluated within the framework of academic regulation AR 17 which states in part, "When a requirement of a course has not been completed for reasons acceptable to the instructor and the rest of the academic work is passing, a report of I (incomplete) may be made and additional time granted." I (incomplete) grades are only assigned in limited cases. Should you experience a death in the family, a major illness or injury, a call to a military commitment, or similar situation, please advise your instructor at your earliest convenience.
- Required Lab Attire** Students must always be properly attired to enter the lab. Appropriate lab attire for includes safety goggles (available for purchase during lab check-in), footwear that completely encloses the entire foot, a lab coat and complete shoulder-to-ankle clothing coverage with clothes made of substantial material. Short pants or dresses/skirts that do not reach the ankle are unacceptable. Each student must wear safety goggles at all times while working in the lab (GBAD 409) and instrument rooms. Failure to adhere to these policies will result in exclusion from the laboratory.
- Lab waste disposal** Know what you are discarding before you discard it. Place waste in the appropriate designated container. Do not add waste to an already full waste bottle. Full means to the shoulders of the bottle, not the top of the neck. If the waste bottle is nearing capacity inform your instructor or GTA and a new one will be provided.
- Student Conduct & Academic Honesty** The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office.
- Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations. Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas: "cheating" (intentional use or attempted use of unauthorized materials, information, or study aid), "fabrication" (intentional falsification or invention of any information), "assisting in dishonesty" (intentionally or knowingly helping or attempting to help another commit an act of dishonesty), "tampering" (altering or interfering with evaluation instruments and documents), and "plagiarism" (intentionally or knowingly representing the words or ideas of another person as one's own).
- For more information about academic integrity & the University's policies & procedures, see the Student Conduct website: <https://beav.es/codeofconduct>

Disability Access Services (DAS) Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at <http://ds.oregonstate.edu>. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Certain medical conditions may limit your full participation in the experimental components of this class. Students with conditions that could be negatively influenced by exposure to any of the materials used in the class should contact the instructor as soon as possible to discuss their options. Appropriate accommodations will be made on an individual case by case basis and where deemed necessary, in consultation with a health care provider.

Reach Out for Success University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)

Policies for In-Person Instruction to Minimize Risk of COVID Transmission

We have been permitted to allow in-person instruction for CH 362 this term, subject to limits and guidelines imposed by the State of Oregon and the OSU administration. You are expected to adhere to these and understand your responsibilities. Our primary focus is to maintain your safety and the safety of the instructional and support staff. We will rely on information at <https://covid.oregonstate.edu/safety-policies> to interpret and enforce expectations.

1. You must wear a mask or other effective face covering. If you arrive without one we cannot supply one and you will have to get one before you return and are permitted in lab. Please note that you should be wearing a mask anywhere on campus.
2. We will attempt to provide enough common equipment (balances, for example) spaced through the lab, but do not congregate in a way that violates the 6-foot distancing standard. While the instructors and TAs will attempt to assist you in assembling and operating lab apparatus, we will need to be conscious of the 6-foot distancing requirement.
3. We will maintain an attendance log each day for contact tracing purposes.
4. You should not come to lab if you experience symptoms associated with COVID: fever, shortness of breath, persistent cough, other flu-like symptoms.
5. You are encouraged, in the event of experiencing flu-like symptoms, to get tested for COVID and to inform the instructor of your situation. You are also strongly encouraged to use the OSU contact-tracing app (<https://covid.oregonstate.edu/exposure>).
6. If you must miss lab and particularly if you are required to self-isolate, you will be encouraged to maintain your progress in the course by participating in the remote section (TR 8-11:30), time permitting, or to observe videos associated with that section and posted in Canvas.
7. Approximately half of the course experience (synthesis, calorimetry) will be in-person. Other aspects of the course (computational chemistry, NMR experiments, writing) will be conducted remotely. We will use Zoom for remote interaction for those activities.
8. We must recognize that conditions on campus or in the state may require us to return to remote instruction at any point. If that happens, we will have staff clean glassware and check you out. Otherwise, you will check out of the lab at the end of the calorimetry experiment.

Safety regulations for chemistry teaching laboratories

Before you begin any work in the laboratory, you must read, understand and agree to abide by the following rules. Your instructor will explain these rules to you and demonstrate proper techniques and first-aid measures. If you do not understand a rule, insist on a satisfactory explanation from your instructor. During lab check-in your TA will show the locations of the fire extinguishers, eye wash stations, spray showers, fire blankets and exits.

Cell phones are not to be used in the laboratory. If you need to make a phone call please step outside the laboratory.

Food or beverages (even bottled water) are not to be consumed in the laboratory. Drinking fountains are located at the main laboratory entrance.

Horseplay and pranks are not allowed in the laboratory. Failure to comply will result in expulsion from the laboratory.

General Conditions

1. **Do not work in the laboratory unless your instructor is present to supervise your work.** A qualified person must be present to (1) see that only safe procedures are used, and (2) provide immediate aid in case of an accident.
2. **Do not carry out any unauthorized experiment.** Perform only those experimental steps in the printed manual, or those given directly to you by your instructor.
3. **Do not work under any condition that you believe to be unsafe for you or others.** If such a condition exists (e.g., overcrowded area, unsafe actions by another student), report it immediately to your instructor or to a faculty member in charge.

Eye Protection

4. **Wear approved eye protection at all times in the laboratory. Approved eye protection means safety goggles with indirect venting sold at the Issue Room.** This is a specific State of Oregon requirement. Failure to comply will result in exclusion from the laboratory. Eyes are very susceptible to chemical injury and must be fully protected at all times. Even when you are not working, a person nearby may be carrying out a chemical procedure that might affect you.
5. **Contact lenses should not be worn in the laboratory.** All types of contact lenses may trap a chemical against the eye tissue and cause permanent eye damage. Check with your instructor if needed.
6. **Do not work with a chemical above or near your face.** For example, holding a beaker up to look at what is in the bottom, or filling a burette which is higher than eye-level, can result in a splash down onto your face.

Handling Chemicals

7. **Many chemicals are toxic and/or corrosive.** Do not assume that any chemical reagent is safe and that it does not require careful handling.
8. **Do not taste or ingest any chemical in the laboratory. Do not keep food or drink items at your lab bench.** It may be toxic. Even NaCl may be contaminated and be unsafe. For the same reason, you can not bring food or drink into the laboratory, or eat in the laboratory (no chewing gum, tobacco, candy, bottled water or drinks, etc.)
9. **Never pipette by mouth.** Drawing up a liquid (e.g., into a pipette) should be done only with a rubber bulb or water aspirator.
10. **Never pipette directly from a reagent bottle.** Transfer only necessary amount of liquid reagents to a secondary container, such as a clean, dry beaker.
11. **Avoid skin contact with any chemical.** Keep the outside of reagent containers, all of your equipment, and the desk top free from chemical spills. Wear gloves if instructed to do so.
12. **Do not inhale reagent fumes.** Odor tests are to be made only when specifically directed to do so. Use a waving motion of your hand to bring the vapor near your nose (this is wafting).
13. **Fume hoods must be used whenever toxic or corrosive vapors are released during the work you are doing.** Use the hood when directed to do so. If fumes develop unexpectedly, cover the container and take it to the hood at once. Work with concentrated hydrochloric, nitric, or acetic acids, or with bromine, chlorine, or hydrogen sulfide should be done only under a fume hood.
14. **Alkalis are particularly corrosive. Contact with NaOH and other alkaline (basic) chemicals must be avoided. Work with solid sodium or potassium hydroxide, or with solutions of these more concentrated than 0.1 molar, should be carried out only under the direct supervision of the instructor.** Strong bases must be handled with great caution because they attack tissues so rapidly. Using 0.1 molar sodium hydroxide in a titration also requires great care. Your instructor will demonstrate proper techniques in handling a base in the laboratory.
15. **Do not heat a test tube containing a liquid over an open flame or directly on a hot plate.** To heat a test tube, hold it in a beaker of hot water. Liquids heated over an open flame may erupt violently and splash onto you or a person nearby.
16. **Do not add water to a concentrated reagent, especially concentrated sulfuric acid.** Keep the mixture as dilute as possible; add the reagent to water. Addition of concentrated sulfuric acid to water causes much heat formation and may result in spattering of this corrosive reagent.
17. **Handle liquid reagent containers with care.** When pouring a liquid, grasp each container so that drips cannot contact your fingers. When using a flexible polyethylene bottle, think first; do not pour from it or squeeze it in any manner that might result in a stream of liquid getting on you, or someone nearby.
18. **Dry all wet glassware before storing it in the locker or returning it to the Issue Room.** If you drop a beaker, for example, do not reach to catch it since this usually leads to getting cut. Keep a cloth towel in your locker to use for drying glassware and wiping your hands. You may purchase this at the Issue room or bring a towel from home.

Handling Glass Tubing and Sharps

19. **Carry glass tubing and glass thermometers only in an upright position.** On impact, glass tubing can snap and become a dagger. Do not run with it (or any other chemical equipment).
20. **To insert glass tubing or a thermometer into a rubber stopper:**
 - a. If needed, fire polish the ends of the tubing. After heating glass tubing, set it aside in a place where you will remember that it is hot.
 - b. Lubricate the stopper hole with water or glycerin. There should not be more than two inches between the stopper and your fingertips on the tubing or thermometer.
 - c. Insert the tubing cautiously, using a towel to protect your hands. If handled improperly glass tubing can break and become razor sharp when inserted into a stopper.
21. **All broken glass laboratory waste must be placed into the special glass disposal boxes in the end aisles in each lab.** Only paper products go into the regular trash cans. There are several paper recycling bags available near the issue rooms and instrument labs.
22. **Waste "Sharps" must be placed in the special red plastic "Sharps" disposal bottles provided in the lab.** Examples of "Sharps" are: syringes, syringe needles, razor blades, and scalpels.

In Case of Accident

23. **Learn the basic laboratory first-aid measures.** These should be demonstrated by the instructor
 - a. **If a chemical splashes into your eye, get help immediately. Shout out, "I have chemical in my eye!"** Seconds count! Immediate removal of the chemical is necessary to prevent possible damage to the eye.
 - b. **If someone nearby gets a chemical in his/her eye, you should: (1) shout for help from the instructor, (2) provide help if the instructor is not there immediately.** A person who has just gotten a chemical in his/her eye usually is frightened, confused and may be unable to help himself/herself.
 - c. **Wash the eye thoroughly with a stream of water from the eye wash fountain, or any other water source. Hold the eyelids open.** After thorough washing (**15 minutes is the recommended time**) the affected person must be taken to get professional medical attention.
24. **Any chemical that comes in contact with your skin should be washed off with water right away.** This is especially important for concentrated reagents and organic liquids.
25. **Know the location of fire extinguishers, fire blankets, and safety showers in case of fire.** Keep acetone and any other organic liquid at least ten feet from an open flame. Use a wet towel to extinguish a small fire or the fire blanket if a person's clothes catch fire.
26. **Proceed cautiously when handling hot objects. Use a towel as a hot pad when handling hot objects. Hot glass looks just like cold glass.** In case of burn, immerse in water immediately. Notify your instructor. Apply clean moist cloth or bandage. Seek medical attention if any question about treatment.
27. **Know the evacuation sirens and exit route from your lab.** When the fire alarm sounds, stop what you are doing and immediately exit the lab, go down the stairs and exit the building. Wait outside for instructions.
28. **Immediately report any accident to your instructor no matter how minor it may seem to you.** Cuts, burns, chemical burns, and inhalation or ingestion of chemicals should be treated as soon as possible by a professional medical person. Neither students nor chemistry staff are qualified to make medical decisions.
29. **You are advised to have private health insurance.** In the case of very minor cuts or burns, an instructor or staff member may escort you to the Student Health Center for treatment, however, in case of an accident, if there is any question, the emergency response team will be called (9-911.)

Clothing in the Lab

30. **You must be covered continuously from shoulders to feet and must wear shoes that cover your feet. Bare feet, sandals, shorts, sleeveless shirts, short shirts, and short skirts are UNSAFE and should not be worn to laboratory. For fire safety, flammable materials, loose clothes, ties should not be worn, and long hair should be tied back.** Full coverage by (cotton) clothing and leather shoes offers the best protection against chemical spills and fire. Older clothing is advised, as is the use of lab coats or aprons.

Chemical Waste Disposal

31. **Only neutral aqueous solutions go down the sink drain. Waste determinations and disposal are done by faculty and staff. Check with your instructor before disposing of any chemical.** All chemical waste is to be sorted into the appropriate waste container and the identity and amount must be logged onto the accompanying inventory sheet. Check with your instructor for specific details.

Leaving Laboratory

32. **Clean your work bench with a damp sponge. Neutralize all acid spills with sodium bicarbonate and wash with a wet sponge. Shut gas jets completely. Wash your hands.** Leave the area safe for the next person.
33. **Do not take any chemical out of the laboratory for any reason. It is illegal!** You may be liable if another person is injured by a chemical (or unauthorized equipment) that you remove from the laboratory.