

San José State University
Chemistry Department
CHEM 113B, Organic Chemistry Lab (II), Section 07-08, Fall 2021

Course and Contact Information

Instructor:	Philip T. Dirlam, Ph.D.
Office Location:	Duncan Hall 001
Telephone:	(408) 924-4998
Email:	philip.dirlam@sjsu.edu
Office Hours:	Wednesday 10:00 a.m. - 12:00 p.m., or by appointment.
Class Days/Time:	Lab: Tuesday and Thursday 10:30 a.m. – 1:20 p.m. Seminar: Thursday 1:30 p.m. – 2:20 p.m.
Classroom:	Science 139 and 135
Prerequisite:	CHEM 113A (with a grade of "C" or better; "C-" not accepted).
Pre/Corequisite:	CHEM 112B

Course Web Page (Canvas)

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the [Canvas](http://sjsu.instructure.com) learning management system course website at <http://sjsu.instructure.com>. You are responsible for regularly checking with the messaging system and Announcements through Canvas to learn of any updates.

Course Description

Continuation of CHEM 113A including more advanced work.

Course Goals

The goal of the course is to achieve greater familiarity with advanced techniques in the synthesis, isolation, purification and characterization of organic compounds. The use of modern spectroscopic techniques for structural determination is also emphasized.

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

1. operate safely in the laboratory and dispose of waste properly.
2. maintain a proper laboratory notebook.
3. demonstrate mastery of advanced laboratory techniques for manipulation of organic compounds including synthesis and purification.
4. obtain and process data from NMR experiments.
5. characterize organic compounds by spectroscopic methods including
 - a. 1D and 2D NMR (^1H and ^{13}C nuclei).

- b. mass spectrometry (exact mass and fragmentation patterns).
6. rationalize regio- and stereoselectivity.
7. develop and analyze a testable hypothesis.
8. locate scientific data and sources from journals as needed.
9. write original formal laboratory reports in ACS journal style, including use of Chemdraw structures.

Program Learning Outcomes (PLO)

Chemistry 113B contributes to the following Program Learning Outcomes for the Chemistry Department:

PLO 1.1 - Students will be able to identify, formulate, and solve a range of chemistry problems (fundamental to complex) through application of mathematics, scientific, and chemical principles.

PLO 1.2 - Students will be able to recognize, relate, and/or apply chemistry terms and concepts to propose and solve interdisciplinary and multidisciplinary real-world problems.

PLO 2.1 - Students will be able to develop an experiment to address a hypothesis using literature and execute the planned experiment using standard chemistry techniques.

PLO 2.2 - Students will be able to acquire, record, and critically evaluate data through use of instrumentation and software, appropriate record keeping practices, figure preparation, and scrutiny of experimental results.

PLO 2.3 - Students will be able to recognize and assess laboratory hazards, practice risk minimization, and conduct safe laboratory practices

PLO 3.2 - Students will be able to identify as scientists within the scientific community through constructing peer reviews, engaging in collaborations, and participating in mentorship.

PLO 4.2 - Students will be able to integrate research findings into a concise written report that either analyzes original data and results or comments on published scientific work.

Required Texts/Readings

Note: quizzes and exams are open book. Electronic versions of the Silverstein and the Pavia texts are acceptable but you must provide the device to view them.

Textbooks

1. Silverstein, R.M., Webster, F.X., Kiemle, D.J. *Spectrometric Identification of Organic Compounds*, 7th edition, 2005 (ISBN 0-471-39362-2) or 8th edition, 2014 (ISBN 978-0-470-61637-6).
2. Pavia, D.L., Lampman, G.M., Kriz, G.S., Vyvyan, J.R. *Introduction to Spectroscopy*, 4th edition, 2009 (ISBN 0495114782) or 5th edition, 2014 (ISBN 128546012X). Note - you will need the "full" edition, not the shortened SJSU version.

Available online:

1. [The ACS Style Guide](https://pubs.acs.org/isbn/9780841239999), found at <https://pubs.acs.org/isbn/9780841239999>.

Note – our section does **not** have Lab Notes for purchase at SAACS this semester. You will be provided with protocols on Canvas.

Library Liaison

Yen Tran (yen.tran@sjsu.edu)

Other technology requirements / equipment / material

Required equipment

- Scientific laboratory notebook with duplicate numbered pages – (You will be provided a notebook on the first day of in-person instruction)
- Calculator
- Pencil
- Pen

You are required to have a laptop/desktop computer available. There are several pieces of software that we use that you must have access to. I will provide the software programs, but you must have a computer to run them on. If you do not have access to a computer, they can be borrowed from SJSU. Here is a link for information on this program: <https://library.sjsu.edu/student-computing-services/student-computing-services>

Lab equipment

You will be assigned an individual locker of equipment for your use during this course. You will be checked into your locker during the first lab period by the instructor and sign an acknowledgement that you have all your equipment. You are responsible for keeping track of all the contents of your drawer. If you lose or break any item, you will be assessed a replacement fee at the end of the semester, so be careful with your equipment. It is possible to complete this course with a relatively small bill for expendable items: it is also possible to end up with a bill more than \$100. At the end of each lab period, make sure you have collected all your locker items before leaving.

When you check in, you will be given a coded check out pad from the storeroom. Note that certain equipment items checked out must be returned the same day to avoid a late fee. Remember, the code on your pad is assigned to you only, don't lose it, or someone else can check out items which will be charged to you.

At the end of the semester, you must clean out your locker, replace all broken equipment or glassware, and have the instructor sign the check-out form. If this process is not completed fully, you may be charged a fee to clean and refurbish your locker. If you drop the class or do not complete CHEM 113B, you must checkout by the last lab meeting to avoid this fee (see the schedule). No checkouts will occur after this date.

Course Requirements and Assignments

This course is primarily based on practical experience, thus attendance for all scheduled lab and lecture sections is mandatory. Two unexcused absences are grounds for failure of the full course.. In addition to time spent in the lab, you are expected to take additional time outside of class to prepare for each lab, learn about upcoming new techniques, practice spectroscopy problems and work on your reports.

Each lab experiment has graded work that can include a prelab, notebook, lab report, and quiz.

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

Lab experiments

1. *Prelab.* A major requirement for success in CHEM 113B is advanced preparation. This means you must read through the experimental procedures and any associated background information carefully before the lab period. You must then plan your lab activities for the day by including: 1) The reaction scheme(s) (if applicable), 2) Your Objective, 3) Your Approach to achieve this objective, 4) New reagents to the reagent table, and 4) The Experimental Procedures you plan to follow. Some protocols may also require you to answer some prelab questions. If an experiment has multiple, discrete steps/stages the Prelab can be broken down to address that specific day's activities. You must turn in a .pdf of a legible scanned or photographed copy of your prelab to Canvas at least 1 hour before lab starts. Detailed expectations will be discussed in class along with an example of how to structure your notebook.
2. *Notebook.* The prelab write-up and all notes and observations from the experiment must be kept in a bound notebook with pre-numbered duplicate pages. All entries must be made in pen - never erase or use 'white out'. Sometimes 'mistakes' turn out to be critical pieces of information. Instead, correct entries by drawing a line through them. Record all of your notes and observations directly in your notebook as they occur. Don't use scraps of paper or cell phone pictures. The purpose of a lab notebook is to be a record of your lab activities, in such clarity and detail that you or someone else could repeat your experiment successfully based on your notebook. Be organized and legible. You will also upload your notebook pages for the lab on the day your lab report is due.
3. *Lab reports.* Formal lab reports, or sections there-of must be in the style of a *Journal of Organic Chemistry* article. Further guidelines will be discussed in class and provided on Canvas. Make sure to address all prompts provided in the lab protocol. All chemical structures and reaction schemes in the formal report must be made in ChemDraw and all data must be included as properly formatted digital figures or tables. The reports must be uploaded to Canvas as a .pdf file.
4. *Quizzes.* A short quiz will be given on each date that a lab report is due. The quiz will interrogate concepts that were explored performing the experiment and analyzing the results in the lab report. Post-lab quizzes will be done through Canvas and will go live the day the lab is due. Once the quiz is open, you will have 15 minutes to complete it.

Spectroscopy lectures and homework

The seminar component of the course will describe general background and applications of several spectroscopic techniques that we will use in CHEM 113B. The seminar sessions may need to be mostly asynchronous due to COVID related complications with scheduling and classroom availability. The seminar sessions will include (video) lectures and practice problems and video. These materials can be found on Canvas. You will need to be diligent and self-motivated to work problems on your own to prepare for the quizzes and final. Additional practice problems can be found in Silverstein, Pavia and any introductory organic text.

Spectroscopy homework will be assigned weekly and will be posted on Canvas. You will have until Friday at 11:59 each week to complete these assignments and upload them to Canvas as .pdf files. These homeworks are open book and notes/Canvas so use any of those materials to your advantage. You are also encouraged to work together. While your work must be your own, feel free to collaborate.

Final Examination or Evaluation

Faculty members are required to have a culminating activity for their courses, which can include a final examination, a final research paper or project, a final creative work or performance, a final portfolio of work, or other appropriate assignment.

In CHEM 113B, we will have a comprehensive final exam based on material from the lab experiments and the spectroscopy seminars. The final will be written in a similar style as the lab quizzes and spectroscopy homework. A study guide will be provided. The final exam is open book/notes.

Aids in homework and exams

All homework and exams are open book (Silverstein and Pavia) and open notes.

Due Dates and Course Schedule

A course calendar will be provided on the course Canvas page. It will provide the due dates for all graded assignments. Please refer to it often to ensure that you are on track for completing the coursework. I reserve the right to adjust the calendar as needed to accommodate changes to the pace of the course.

The Final Exam Date and time is absolute and will not be rescheduled nor will a make-up exam be made available unless a legitimate, properly documented emergency arises.

Our Final is on: Thursday, December 9 from 9:45 a.m. to 12:00 p.m.

Grading Information

Determination of Grades

The grand total of lab-related work will contribute to 50% of your final grade (250 pts). Spectroscopy homework will contribute 30% of your final grade (150 pts). The final exam is worth 100 pts (20%). See the course schedule (below) and Canvas for due dates, but lab reports will be due at the beginning of the lab period unless otherwise noted.

Assignments	Points
Lab Reports	150
Lab Quizzes	50
Spectroscopy Homework	150
Final Exam	100
Total	500

Points will be distributed as described in Assignments above. I reserve the right to scale quiz and exam scores. Scores will never be scaled down. The course grade will be determined from the resulting percentage of the total points you earn out of the 500 points possible. Grades will be assigned as follows:

<u>Percent of Possible Points Earned</u>	<u>Final Course Grade</u>
97-100%	A+
93-96%	A
90-92%	A-
87-89%	B+
83-86%	B
80-82%	B-
77-79%	C+
73-76%	C
70-72%	C-
67-69%	D+
63-66%	D
60-62%	D-
< 60%	F

Late work

Lab reports submitted after the due date on Canvas are considered late and given up to an initial 20% point reduction with subsequent 5% point reductions for each further day late. No reports will be accepted after the Final Exam.

Plagiarism

Plagiarism on lab reports will not be tolerated and will result in a score of 0 points for the report and a disciplinary referral to the Office of Student Conduct and Ethical Development. Additionally, any use of Chegg, Course Hero, Bartleby or other similar sources on exams, quizzes, or reports will be considered a severe violation of [SJSU's Academic Integrity Policy](#) and will result in failure of the course and disciplinary action.

Missed Quizzes

If a quiz or homework is missed without a legitimate excuse, a score of 0 will be entered for that assignment. If an acceptable excuse is provided a make-up quiz will be administered or the quiz score will be prorated. Please notify me in advance if you will miss a quiz date for a legitimate activity.

Classroom Protocol

Safe and Respectful Community

We hope that the classroom will serve as an environment that will promote learning and the development of new ideas, as well as be a safe and respectful community. Behavior that interferes with the normal academic function in a classroom is unacceptable. Students exhibiting this behavior will be asked to leave the class. The university has a [brochure on student conduct](#) that you can view at your convenience.

Consent for Recording of Class and Copyright of Instructor Generated Course Materials

[University Policy S12-7](#), <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor's permission to record the course.

1. "You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material."
2. "Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent." This includes posting any portion of course content to internet sites and is an violation of copyright and subject to disciplinary action.

Safety

Before you will be allowed to work in the laboratory, all students in CHEM 113B must:

1. Attend the safety lecture (first lab meeting).
2. Read the [Safety Rules for Teaching Laboratories](#) on the chemistry department website found at http://www.sjsu.edu/chemistry/Documents/Safety%20Sheet%20for%20Teaching%20Laboratories_053118.pdf.
3. Pass (grade of 80% or above) a short quiz on laboratory safety.

All of the above conditions are mandatory, and must be completed before you will be allowed to work in the lab.

In addition:

1. Always wear safety goggles in the lab when anyone is conducting an experiment.
2. We will be using some flammable solvents, do not have any flames when you (or someone else in the room) are handling flammable solvents.

3. Treat all reagents as potential hazards. Use gloves properly and avoid skin contact. In case of contact, inform the instructor immediately and flush with water for 15 min. Similarly, if you have a spill, never leave it unattended and let the instructor know.
4. Glassware breaks. Use caution in any experimental procedure, and exchange any chipped or cracked glassware. Notify the instructor of broken glass so she can assist in clean up. Dispose of all glassware in the broken glass bins, not in the trash cans.
5. You are absolutely required to follow any instructions provided by the instructor related to procedures and/or safety. Failure to do so will result in your immediate disenrollment from this class.
6. If you are not sure, ask!!

In addition, for safety reasons, before you start an experiment, you are expected to fully understand the procedures and hazards involved, and follow the instructor's directions.

Failure to comply with proper procedures and prescribed safety concerns shall subject the student to disciplinary action.

1. Any student who engages in unauthorized experimentation, or who seriously disregards safety, thereby endangering self or others shall be withdrawn immediately from the class with a grade of "F".
2. Any student who shows persistent disregard for safety may have his/her grade lowered, and may risk being withdrawn with a final grade of "F".

Special rules of safety and conduct apply when using instruments. These will be provided by the instructor. If you have any question or uncertainty about use of any instrument do not hesitate to ask.

With preparation and organization, it will be possible to complete all of your lab work during the scheduled lab period. Except in unusual cases, no lab work will be permitted outside of the scheduled lab times. Usually, the only situation where this may be allowed is in cases of illness where more than a few periods are missed and for which you provide verification by your doctor. In any case, under NO circumstances are you to work outside of your appointed lab period without the written approval of the 113B instructor. Any student found working without expressed permission outside of the lab time will be disenrolled from the class.

Chemical Safety (CHEM 120S)

CHEM 120S (Chemical Safety) is a required course for all chemistry majors and minors.

Emergencies and Building Evacuations

If you hear a continuously sounding alarm, or are told to evacuate the building by an Emergency Coordinator, walk quickly to the nearest exit (out the door and turn left to exit the Science Building). Take your personal belongings as you may not be allowed to return. Follow the instructions of the Emergency Coordinators. Be quiet so you can hear instructions. Once outside, move away from the building. Do not return to the building unless the Police or the Emergency Coordinator announce that this is permissible.

Students planning to take CHEM 114

If you plan to take CHEM 114, note that the prerequisite of CHEM 100W (or equivalent course approved by your advisor) will be strictly enforced. Students without a 100W course completed will not be allowed to enroll in CHEM 114.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>.