

# Chemistry 113A Organic Chemistry Laboratory (Sec 4) Fall 2019

## Contact Information

<b>Instructor:</b>	Philip Dirlam, Ph.D.
<b>Office Location:</b>	Duncan 516
<b>Telephone:</b>	(408) 924-4998
<b>Email:</b>	philip.dirlam@sjsu.edu
<b>Office Hours:</b>	Tues 10:00 – 11:00 am, Wed 3:00 – 4:00 pm, and by appointment.
<b>Class Days/Time:</b>	Lab: Tues & Thurs, 2:30pm - 5:20pm
<b>Classroom:</b>	Science 139
<b>Prerequisites:</b>	CHEM 112A (with a grade of "C" or better; "C-" not accepted)

## Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, problem sets, etc. can be found on the Canvas web page for this course. I will also use the email address listed on your mySJSU account to send information on Chem 113A. You are responsible for checking for new files on Canvas and messages from me on your email on a regular basis to learn of any updates.

## Course Description

This course introduces many of the basic techniques for synthesis, isolation, purification and identification of organic compounds. The emphasis is on practical laboratory skills. Sufficient theoretical background will be developed to allow the student to understand the design of experiments and to modify established procedures. The course will also provide practice in the formal writing of experimental procedures and findings. See the "Schedule of Experiments, Quizzes and Final" at the end of this document for important dates.

## Required Texts/Readings

### GREENSHEET AND SCHEDULE

You can access copies of this Greensheet and Schedule on the Chemistry Department website (<http://www.sjsu.edu/chemistry/>) - look for your section in the "Greensheets" link. It will also be posted on the Canvas site for your 113A section.

**Textbook** (*IF YOU ARE A CHEMISTRY MAJOR or MINOR, READ THE COMMENT ABOUT THE PAVIA TEXTBOOK*)

### Required Books

1) Fall 2017 **Chem 113A Lab Notes** available for purchase from the Chemistry Club (Duncan Hall 20 - cash only) - you must have your own copy by the second-class meeting.

***IMPORTANT: you MUST have the current (FALL 2018) version of the Chem 113A Lab Notes - important procedural and safety changes have been made from prior versions. You must present your copy of your Lab Notes with your Exp A prelab notebook for approval***

2) Pavia, D. L., Lampman, G. M., Kriz, G. S., Vyvyan, J. R. *Introduction to Spectroscopy*, 5<sup>th</sup> ed., **SJSU version** (note this edition is a custom version available only at the SJSU Bookstore) - DO NOT obtain the electronic (eBook) version for this class. This is a new edition of this text; older editions will contain significant differences.

***CHEMISTRY MAJORS or MINORS WHO NEED TO TAKE CHEM 113B and/or 114 IN THE FUTURE SHOULD OBTAIN THE FULL EDITION OF PAVIA\* - the SJSU Bookstore does not carry this edition, but it can be obtained from Amazon or other book sellers. You will need this version if you take Chem 113B and/or Chem 114.***

\*ISBN 978-1285460123 (needed starting the week of Sept 16)

**Whichever version of Pavia you obtain, you must have your own PRINT copy for your use during quizzes and exams - sharing of books and computers are not allowed.**

### **Other Readings**

- McMurry, John, *Organic Chemistry* (any recent edition), or an organic chemistry textbook from a one-year Ochem lecture course.
- *The ACS Style Guide: Effective Communication of Scientific Information* 3rd ed.; Coghill, A. M., Garson, L. R., Eds.; American Chemical Society: Washington DC, 2006

### **Other equipment / material requirements**

- Scientific laboratory notebook with duplicate numbered pages - these are also available for purchase from the SJSU Chemistry Club (DH20)
- Basic calculator (one that cannot connect to the internet, bring to every quiz/exam)
- Pencils, rulers

### **Library Liaison**

The Chemistry Library Liaison is Yen Tran (yen.tran@sjsu.edu)

## **Course Requirements and Assignments**

**Catalog Description** Fundamental techniques for the isolation, characterization and synthesis of organic compounds. Prerequisite: CHEM 112A (with a grade of "C" or better; "C-" not accepted). Misc/Lab: Lab 6 hours.

You must have completed Chem 112A with a grade of "C" or better to enroll in Chem 113A. You may not take Chem 112A concurrently with Chem 113A. **If you are repeating Chem 112A, you may not take Chem 113A until you complete 112A with a "C" or better.** If

you took an 112A-equivalent course at another institution, the instructor may ask for verification and information on the lab course you took.

The scheduled time for Section 4 is TuesThurs 2:30pm to 5:20p.m. in Science 139. It is **mandatory** that:

-you attend all meetings of this course (see attendance below) according to the schedule  
-you are in the lab room at the beginning of every lab meeting. I will go over important safety items for the days' experiments; if you are not present to hear these instructions, I will not allow you to work in the lab for the day.

Chem 113A will include seven Experiments (A to H). You will prepare written reports for each of these Experiments. These reports must be submitted both on paper and to turnitin.com (via Canvas assignments). Eight laboratory quizzes based on these experiments will also be given, as well as a Midterm and Final Exam (see Schedule at the end of this document).

Dr. Straus has created a website for Chem 113A that provides a wealth of information for this course, including information for each lab experiment, as well as videos and photos depicting most of the techniques you will be performing in Chem 113A. You should bookmark this site and refer to the relevant sections before each lab meeting and as you prepare your reports:

<http://www.chemistry.sjsu.edu/straus/visioche.htm>

***IMPORTANT!!***

***Use only the information found on the Chem 113A website to prepare for your experiments. DO NOT use the supplemental experimental pages at the end of Pavia, which have not been updated recently and are mostly out of date!***

### **Check-In Policy**

When you check-in to a locker for Chem 113A on the first day of class, you will be indicating to us on the Locker Card Form that you intend to remain in this course. If you later drop Chem 113A, a \$50 Locker Fee will be assessed.

### **Course Goals and Learning Objectives - Chem 113A**

- Students will be able to demonstrate their knowledge of departmental safety rules through their laboratory practice, including the ability to dispose of waste properly
- Students are expected to apply basic stoichiometric algorithms (such as calculating limiting reagents, theoretical yield and mole ratios) in the context of organic chemistry.
- Students will be expected to demonstrate a command of the rules for assigning significant figures in their work, specifically in calculations and laboratory measurements and calculations.
- Understand and be able to use the basic operations of an organic chemistry laboratory including gravity & vacuum filtration, liquid-liquid extraction, distillation, reflux, recrystallization, drying of solids and solutions, and the theories behind these techniques.

- Know the significance of pK<sub>a</sub> values in experimental steps.
- Identify and assess the purity of organic compounds using analytical techniques including melting point, thin layer chromatography (TLC), IR (*v.i.*<sup>1</sup>), NMR (*v.i.*), and gas chromatography (GC).
- Deduce organic structures using spectroscopic methods: especially infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy.
  - determine molecular formulas from structures, molecular mass (using the Rule of 13), and other sources of information.
  - be able to deduce hydrogen deficiency index (HDI) from a molecular formula and use this in structure determination.

For NMR spectroscopy, students will be able to:

- understand the fundamental theory of 1-dimensional proton NMR analysis
- understand the concepts of equivalent and non-equivalent hydrogens.
- understand the effect of structure on chemical shift and coupling constants.
- demonstrate awareness of the regions of the NMR spectrum where various key protons are found.
- calculate chemical shifts for substituted alkanes and aromatics using tables.
- demonstrate how to utilize integrals for structure analysis
- construct splitting diagrams (“trees”) and be able to measure coupling constants from an NMR spectrum, or predict coupling constants and trees from a structure.
- recognize and know how to test for exchangeable hydrogens in a molecule.
- identify the peaks that correspond to the solvent and to the internal reference (TMS).
- deduce unknown structures and fully assign an NMR spectrum to the structure.

For IR Spectroscopy, students will be able to:

- explain the basic principles of IR spectroscopy.
- identify and explain factors that influence the strength and frequency of an IR peak.
- assign key peaks in an IR spectrum.
- determine which peaks are most diagnostic in making an assignment of structure using IR.

---

<sup>1</sup> *Latin* vide infra (see [below](#))

- record an IR spectrum.
- deduce unknown structures and fully assign an IR spectrum to the structure.
- Students will be able to follow a detailed experimental procedure, and construct a flow diagram to illustrate it.
- Students will be able to explain the theory behind the operations performed, including being able to explain deviations from the theoretically optimum results (which is the usual case), and suggest improvements to the procedures employed.
- Students will be able to depict and explain detailed chemical mechanisms for all laboratory reactions employed in Chem 113A, and for related reactions.
- Students are expected to keep contemporaneous notes – They will demonstrate the ability to maintain a proper lab notebook.
- Students will be able to construct a lab report that includes an analysis of the data collected, and discussion of the outcomes and answers to open questions associated with the Experiment.

### **Program Learning Outcomes (PLO)**

Chemistry 113A satisfies the following Program Learning Outcomes for the Chemistry Department:

PLO #2 - Demonstrate understanding of core concepts and to effectively solve problems in organic chemistry.

PLO #6 - Answer questions regarding safe practices in the laboratory and chemical safety.

PLO #7 - Demonstrate safe laboratory skills (including proper handling of materials and chemical waste) for particular laboratory experiments.

### **Tentative Course Calendar:**

A schedule of experiments, report due dates and lab quizzes appears at the end of this Greensheet (also posted on the Chemistry Department homepage and on the Canvas page for this course). In addition, note the following EXAM dates:

<b>Midterm Exam</b>	<b>Tues Oct 22 (90min during lab session)</b>
<b>Final Exam</b>	<b>Wed Dec 11 (2:45 p.m. to 5:00 p.m.)</b>

The schedule for experiments (see end of the Greensheet) is tentative and is subject to modification (however, the Midterm, Final Exam and due date for the last experiment will not change). Any changes will only be announced during lab meetings only (no notice will be sent by email). It is your responsibility to keep aware of the schedule, especially due dates of reports, quizzes and exams. You must be present on all quiz and exam dates - do not plan any travel or other absences on these dates. Makeup quizzes are not provided if you come late or are otherwise not present when a quiz is given.

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per

unit per week), including preparing for class, participating in course activities, completing assignments, and so on. [More details about student workload can be found in University Policy S12-3 at](#)

<http://www.sjsu.edu/senate/docs/S12-3.pdf>

## Attendance Policy / Lab Makeup

NOTE that University policy F69-24, "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

Your attendance is **mandatory** for ALL Chemistry 113A lab meetings. The semester schedule is set to provide just enough time for most students to complete all of the experiments. Missing labs will cause you to fall behind and options for makeup are limited (see below). If too many labs are missed, it may not be possible to make them up, even if there is a valid reason. Keeping on time with the schedule requires both your attendance and significant amount of preparation before each lab meeting.

***If you cannot attend all lab meetings due to your work, travel, or other reasons, you should not enroll in Chem 113A.***

For Chem 113A, you **MUST** arrive by the stated start time of each lab session. At the start of every lab, the instructor will give important instructions for that day's experiment, including critical safety issues that you must be aware of to conduct the experiment safely. If you arrive late, you will not be allowed to work on that day - the instructor will not repeat safety and other information for any late students. No makeup is possible if you miss a lab due to late arrival.

***This rule will be strictly enforced so plan your commute schedule to arrive on time!***

Makeup of labs may be possible in only certain circumstances and is not guaranteed. In general, only unexpected circumstances such as medical reasons with a doctor's note will be considered. A "**Permission to work in organic chemistry labs**" form must be signed by me and presented to the other lab instructor (which must be the another section of Chem 113A). *However, the other instructor may choose to not accommodate a makeup student, so obtaining a permit does not guarantee additional time to work.* Work permits will not be granted due to falling behind due to poor preparation, or missing labs due to travel or other unauthorized absences (e.g. studying for exams for other courses). There must be a valid reason with documentation (such as a doctor's note) attached to the permit. If you miss a lab or leave early, you will lose points from your experiment grade since your notebook will not be countersigned by the instructor.

Each lab period is 2 hours and 50 minutes. If you finish your lab work early, you should use the remaining time to work on prelabs, spectroscopy problems, or on Experiment H. Instructors will not countersign your notebook if you leave early. There will always be sufficient work for you to utilize the entire lab period, so you should not leave before the end time.

## Grading Policy

### GRADING (see below for numerical breakdown and percentages)

Laboratory Reports: Seven reports will be due for Chem 113A. The format for each varies somewhat, information is provided below (Laboratory Reports) and on the Chem 113A website for each experiment (see "writeup"). Points are deducted for reports turned in after the due date for that report (up to -2 pts./day). See below for more information on late reports. The writeup section of your report must also be submitted to Canvas "Assignments" before the start of the lab period in which the report is due. Submitted reports will be analyzed by turnitin.com and an analysis of your report will be provided to me. If you have issues with accessing Canvas, let me know in advance of the first due date.

Laboratory Notebook Countersign points - at the end of each lab day, you must present your lab notebook to be countersigned by the instructor. If not signed, **2 points per missing signature will be deducted from the total grade for that report.** Signatures will not be given once a lab period is over or if you miss a lab due to an unexcused absence.

**Signatures will only be given in the last 20 minutes of the lab period - if you finish your lab work early, this does not mean you can leave! You should work on your lab notebook for the next experiment, spectroscopy problems, clean your dishes, or other lab work.**

Lab Quizzes: A total of 8 laboratory quizzes based on the experiments will be given at the start of certain lab periods - see Schedule. These will be brief quizzes based on the experiment that was just completed. Note Experiment B and DE have 2 lab quizzes each.

On Experiment Due Dates: Your complete experiment reports and submission to turnitin.com are due at the **start** of the lab period indicated by the due date. Once the reports are collected a Lab Quiz will be given, usually in the first 5-10 minutes of the lab period. You must be present to take the lab quiz - no makeups will be provided if you arrive late or are absent. Reports are "late" if any component is turned in after the lab quiz has begun (see below).

Midterm Exam: a midterm exam based on material covered to that point will be given.

Final Exam: a comprehensive Final Exam will involve all topics covered in Chem 113A.

Note that the final 113A grade is based on a *conglomerate* of the individual graded items. Thus, if you have a somewhat low grade on one item, you can make it up with a better grade of another item. The course grades are given on a "+/-" system, and the instructor may modify the point total up to 10% higher or lower based on a student's performance in the lab (such as preparation and efficient use of time, general lab skills, etc.).

All quizzes and exams are open to the printed version of the Pavia textbook ONLY- electronic versions (eBooks) are <u>not allowed</u> during quizzes and exams. You are <b>required to bring your OWN copy for the exams.</b> Sharing of books during tests is not allowed. Using any device which has access to the Web is prohibited during any 113A quiz or exam.
--

## Grading Information:

The grades for this course will be assigned as "plus/minus." The points and percentages of each type of graded items is as follows:

7 laboratory reports	450 points total <sup>a</sup> (45%)
8 laboratory quizzes	100 points total <sup>b</sup> (10%)
Midterm	150 points (15%)
Final exam @ pts	<u>300 points (30%)</u>
Total possible for 113A	1000 points possible

<sup>a</sup>Experiments A, C, F - 50 points; Experiments B, DE, G and H - 75 points

<sup>b</sup>Quizzes A, B1, B2 and C - 10 points; Quizzes DEI, DEII, F and G/H - 15 points

The overall course grade will generally follow the following correlations:

A+ = 100-97%	A = 96-93%	A- = 92-90%
B+ = 89-87%	B = 86-83%	B- = 82-80%
C+ = 79-77%	C = 76-73%	C- = 72-70%
D+ = 69-67%	D = 66-63%	D- = 62-60%
F = <59% Unsatisfactory		

Late reports beyond a deadline will be assessed a penalty of up to **-2 points per day past the due date (weekend days will count as -2 points each day)** - medical absences with documentation will be considered. The report is considered fully "turned-in" when all required items are submitted. Late reports for Experiments will be accepted only up until graded reports are returned to the class (i.e. late reports will not be accepted once I return the graded reports to the rest of the class).

The reports for Experiments G and H must be received by the due date shown on your schedule. ***No reports will be accepted after the last lab meeting of the semester (the check out day for your section).***

All experiment reports are **mandatory**: if no report is turned in, up to 10 points will be deducted from the total points accumulated for the semester.

In order to estimate your current grade in this course and progress towards your course grade, keep track of scores for all graded assignments (quizzes, lab reports, midterm) as the semester progresses. Add the points you obtained and divide by the total points scored up until that time to determine your % of points to that date. Compare the % to the table to estimate your current grade standing.

Bear in mind that the final course grade is based on multiple components so you have different opportunities to make up a low score. Especially towards the second half of the semester, monitor your accumulated points and %, because that will indicate to what extent you will need to obtain points to attain a desired course grade. A word of advice is that you should not rely on the last report and/or the final exam to make up for a low point total!

When reports are returned to you, you will find written comments on them and a rubric that shows a breakdown of points for each section of the report. Review these carefully since they not only provide feedback on that report, but are intended to guide you for future



reports. Use both the written comments and review the "writeup" section of each Experiment from the 113A website to assess your progress in this course.

For security reasons, final course grades are not posted, sent by email, or given over the phone. If you would like a breakdown of your 113A scores, leave a stamped and addressed envelope with me at the final exam.

Use the 113A schedule below to plan your time accordingly. Preparation for the lab will help you immensely to keep on schedule.

“A minimum aggregate GPA of 2.0 SJSU Studies (R, S, & V) shall be required of all students as a graduation requirement.” To see full text, review [University Policy S11-3](#) at

<http://www.sjsu.edu/senate/docs/S11-3.pdf>

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 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

## Equipment

A printed copy of current Stockroom policies will be provided to you when you check-in to a locker. These policies will be rigidly enforced so read them immediately - ask the Stockroom staff if you have any questions.

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 of your equipment. ***Your check in day is the only day when missing or broken/chipped items will be replaced at no charge.*** After the first day, you are responsible for maintaining all of 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 >\$100 bill due to loss or breakage. At the end of each lab period, make sure you have collected all your locker items before leaving and lock your drawer!

When you check in, you will be given a coded check out pad from the storeroom. You may use this pad to check out additional equipment from the storeroom which may be required for a particular experiment. **Note that certain items checked out must be returned the same day to avoid a late fee.** Remember, the code on your pad is assigned ONLY to you, don't lose it, or someone else can check out items which will be charged to your account.

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 or do not complete Chem 113A, you must check out of your locker to avoid a \$50 or more check out fee. All checkouts must be done by the last lab day of your lab meeting (see schedule); no checkouts will be done after this date.

## **Classroom Protocols for Chem 113A:**

### **Schedule:**

The detailed schedule at the end of this greensheet gives dates on experiments and due dates, quizzes and exams. In most cases, a prelab lecture about each experiment will be given before the "begin" date of each experiment. In addition, supplemental lectures will be given as needed. The schedule is subject to change and changes will be announced in class. However, the midterm or final exam dates will not change.

### **Preparation for Experiments:**

In order to be allowed to begin each Experiment, you must prepare a "Prelab writeup" in your notebook prior to the start of that experiment, and have it approved by me. On the Chem 113A website, under "Course Handouts" see "Notebook Format" - the prelab should be completed for each experiment from items A to I. If anything is missing or erroneous, you will be required to correct the item, which will delay when you start the experiment. A "Sample Prelab for Exp A" is found on the Chem 113A website under "Course Handouts." For this one experiment only, you may copy this information in your notebook and show it to me as your prelab. For subsequent experiments, use this as a template and provide similar information when you prepare those Prelabs. The importance of the Prelab is not only so you know the details of the experiment, but also so that you are aware of any safety issues that may be involved. **Under no circumstances are you to begin working on a lab experiment without my approval - if you do so, this will be grounds to be dropped from this lab section.**

As the name implies, the "prelab" should be completed before you begin a lab, and should be completed prior to coming to class. Obviously, if you have to work on a prelab during the lab period, you will seriously deprive yourself of adequate lab time to complete the experiment. The lab schedule is arranged so there should be adequate time to complete each experiment within the allotted dates, but only if you come prepared for each lab.

**When I have approved your prelab, I will sign your Lab Report Summary sheet (found in the last pages of your Lab Manual and also on the website) and provide you with the starting material for your experiment.**

### **Observations and Data in Lab Notebooks:**

Lab notebooks will be a component of your grade. They must be kept up to date on a daily basis with details of your results and progress. The format for lab notebooks and data collection can be found in the Chem 113A website, under the drop down menu for "Course Handouts," All of these files contain useful information that will guide you in preparing notebooks and reports for the entire semester.

The preliminary write-up of all notes and observations must be kept in a bound notebook that has pre-numbered duplicate pages. All entries must be made in pen - NEVER erase or use "white out"! **RECORD ALL OF YOUR NOTES AND OBSERVATIONS DIRECTLY INTO THE NOTEBOOK, AND AS THEY OCCUR.** In other words, don't write down numbers on scraps of paper and transfer them later, or try to memorize your measurements. The main purpose of the notebook is to be a daily "journal" for your laboratory activities to which you, or someone else, can read at a later date, and fully understand what you did, how you did it, and why the results came out the way they did. It's OK to scratch out entries - the main point is that it is organized and understandable.

As you'll learn, in professional situations the lab notebook is considered a legal document, and there are rules about how they are prepared and maintained. A typical practice is to have the notebook "countersigned" at the end of each lab day by someone else. For Chem 113A, I will countersign all notebooks (no sooner than 20min before the lab ends) - this means you must show me your notebook before you leave each day to review and sign. When grading reports, up to two points will be deducted per lab day if my signature is missing. This also applies if you miss a lab due to an unexcused absence.

### **Lab Reports:**

After the experiment is finished, analyze your data and write your conclusions in your notebook. Again, in the Chem 113A website, Dr. Straus has provided guidelines for writing your notebooks under "Course Handouts" see "Notebook Format" Be sure to include at least a brief summary statement in your notebook for every experiment.

Detailed information on the preparation of the written portion of your report is found in the "Writeup" section under each Experiment in the Chem 113A website - look at this information before you begin working on your report!

Each report should follow the format designated for that type of experiment; in this class. There are two kinds of experiments, preparative and investigative; formats for the two differ (see Notebook Format on the 113A website). Reports must be complete, well organized and legible. Every Experiment has one or more "questions" that must be analyzed and justified. Under the "write-up" tab for every experiment on the Chem 113A website, we give you information on what should be included in each writeup. Figures and structure drawings may be done by hand, but they must be clearly rendered.

*Your written reports must be submitted to Canvas Assignments before you come to class on each due date. Canvas will check each report using "turnitin.com" where it will be compared to many thousands of similar reports for similarity.*

**IMPORTANT!!** Reports are to consist of your own thoughts and be expressed in your own words (see Academic Honesty below). The purpose of these reports is to give me an opportunity to evaluate your comprehension of the experiment and results. If you copy information from another source, whether you give credit or not, it provides me with no basis to gauge your understanding. You should always cite the source of information (use superscripts to your references), but do not copy any portion from another source word-for-word - always re-word the passage.

Do not use another student's report as a template for your report, as turnitin.com will "flag" both reports as being plagiarized - an excessive amount of plagiarism may result in a grade of zero "0" points for that paper. The best advice is to work on your paper on your own to avoid problems.

### **REPORT SUBMISSION:**

**On the Chem 113A website, under "Course Handouts" see the document "Report Submissions" for information on how to prepare and submit your reports. Read the information on plagiarism in this document.** If you are still not sure what constitutes plagiarism, ask me before your first report.

## SAFETY

Knowing how to work safely in an organic chemistry laboratory is paramount for Chem 113A. For your safety and of your classmates, you will be required to understand and follow safety policies that are provided to you.

Before beginning any lab work, the following items must be completed:

- 1) Attend the Safety Lecture
- 2) Read and sign the statement on Chemical Safety for Chemistry Labs (go to this site):

[http://www.sjsu.edu/chemistry/Documents/Safety%20Sheet%20for%20Teaching%20Laboratories\\_053118.pdf](http://www.sjsu.edu/chemistry/Documents/Safety%20Sheet%20for%20Teaching%20Laboratories_053118.pdf)

- 3) View the Chemistry Safety film and sign the viewing voucher
- 4) Take the Lab Safety Quiz and obtain a score of 80% or better; retake the quiz if score is <80%.

**All of the above conditions are required, and must be completed before you will be allowed to work in the lab!**

In addition to the points covered above, the following rules are emphasized in this lab:

1. ***AS SOON AS ONE PERSON BEGINS WORK IN THE LAB, YOU MUST ALWAYS WEAR SAFETY GOGGLES, EVEN IF YOU ARE NOT DOING ANY WORK YOURSELF!!!*** (over your eyes, not on your forehead!) If you see a fellow student not wearing eye protection, you are obligated to remind them to protect their eyes.

2. Be aware that we will be using some flammable solvents, do not have **any** flames when you (or someone else in the room) are handling these

3. Similarly, treat all acids, bases, and reagents as potential hazards. Avoid skin contact with all of these, and treat any contact immediately. If you have a spill, never leave it unattended - let the instructor know.

4. Dispose of all glassware in the special bins, not in the trash cans! This includes broken glass, as well as expendable items such as pipettes and melting point capillaries.

5. Some experiments require special safety precautions - these may be found in the protocols or given by the instructor. Always enter these into your procedure/flow scheme section in your notebook (this is another reason to read ahead and to be on time at the start of each lab)

6. 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 grade or result in immediate disenrollment from this class (see statement below).

7. Everyone working in the lab is expected to conduct yourself in a professional manner; no horseplay or unsafe actions are allowed.

8. Gloves are required for many experiments. These are always available from the Stockroom for a cost. You may prefer to purchase a box of disposable gloves to use during the semester.

9. Minimize contact with all liquid and solid chemicals, and DO NOT intentionally breathe in any vapors. Where practical, do experimental work in the hoods.

10. Note in the safety rules, that legs and feet must be covered - no shorts, sandals or open toed footwear allowed. You will not be allowed to work in the lab. I suggest you bring a change of clothes on lab days.

101. If you are not sure, ask!!

Failure to comply with proper procedures and prescribed safety cautions 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 the Bruker Fourier 300 NMR and the GC and other instruments. These will be provided by the instructor.*

With preparation and organization, it is possible to complete all of your lab work during the scheduled lab period. In general, 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 and for which you provide verification by your doctor (see makeup policy above). However, if you miss more than a few lab periods during the semester, it may be difficult to complete the course. **In any case, under NO circumstances are you to perform any laboratory work for 113A outside of the scheduled lab time without my written permission.** Any student found performing unauthorized lab work for 113A may be disenrolled from the class.

#### **Additional Safety Policies for Chem 113A:**

Visitors: No visitors are allowed in the lab at any time. If someone is waiting for you, they must wait outside the lab.

Cell Phones, music/video/game players: These may not be used in the lab. Unless you have an emergency, turn off cell phones and make your calls before or after class. **DO NOT make calls when an experiment is in progress!**

Computers: You may use your laptop only during class lectures. Once lab work begins, put your computer away since they will take up valuable space on the bench and may be damaged by chemicals or spills. If necessary, you can use the iMacs in Sci 139 and 154, and 4 PCs in the melting point room.

While working in the lab, distractions while working must be kept to a minimum - this includes music and videos. Headphones or earbuds may not be used - you must be able to hear instructions or emergency situations.

#### **Chemical Safety (CHEM 120S)**

[CHEM 120S Chemical Safety Seminar](#) is a required course for all chemistry majors and minors. The [Safety Training](#) (not CHEM 120S) is a requirement/prerequisite for CHEM 180/298, if working in a wet/chemical research lab.

#### **•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 lab door and go to the nearest exit of 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 announces that this is permissible.

### **Additional 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/>

**Make sure to review these university policies and resources.**

The topics include the following:

[General Expectations, Rights and Responsibilities of the Student](#)

[Dropping and Adding](#)

[Consent for Recording of Class and Public Sharing of Instructor Material](#)

[Academic integrity](#)

[Campus Policy in Compliance with the American Disabilities Act](#)

[Student Technology Resources](#)

[SJSU Peer Connections](#)

[SJSU Writing Center](#)

[SJSU Counseling and Psychological Services](#)

## **Chem 113A Fall 2019 - TuesThurs Sections**

*Any changes to this schedule will be announced by your instructor in advance and only in your lab section.* Prelabs for each Experiment will be given at an appropriate time for your section - you must be present to learn of important experimental and safety instructions. On report due dates, to be "on time" you must A) submit your report to turnitin.com before lab begins, AND B) submit a complete paper copy of your report before the lab quiz begins. A lab quiz will be given based on the experiment just turned in (or on spectroscopy topics as given by your instructor).

### **General Schedule of Experiments (see calendar below for dates)**

<b>Experiment A</b>	<b>Synthesis of Aspirin</b>
<b>Experiment B</b>	<b>Parts I &amp; II Separation and Identification of an Unknown Mixture (Spartacetin)</b>
<b>Experiment C</b>	<b>Introduction to IR and NMR Spectroscopy</b>
<b>Experiment DE</b>	<b>Part I: Distillation and GC of an Unknown Alcohol Mixture Part II: Esterification of an Unknown Alcohol</b>
<b>Experiment F</b>	<b>Preparation of a 2,4-DNP Derivative of an Unknown Ketone</b>
<b>Experiment G</b>	<b>Oil of Cloves</b>
<b>Experiment H</b>	<b>Spectroscopic Identification of an Organic Unknown II</b>

**Details of each Experiment, techniques and other supporting information can be found on the Chem 113A website:**

<http://www.chemistry.sjsu.edu/straus/visioche.htm>  
 (or simply Google "SJSU Chemistry 113A")

***NOTE: Beginning in Fall 2019, we will begin the process of revising and migrating information from the Chem 113A website to Canvas. For each Experiment, your instructor will inform you whether you should use the Chem 113A website or Canvas – this will ONLY be announced during pre-lab lectures, so you must be present to know which version you should use!***

Chem 113A TuesThurs Sections - Fall 2019 Tentative Schedule –  
 subject to change.

## August 2019

Sun	Monday	Tuesday	Wednesday	Thursday	Friday	Satur
18	19	20	21	22 NO LAB	23	24
25	26	27 <b>FIRST DAY LAB</b> Check-IN Safety Lect & Quiz Prelab Exp A	28	29 Begin A	30	31

## September 2019

Sun	Monday	Tuesday	Wednesday	Thursday	Friday	Satur
1	2 <b>LABOR DAY</b>	3 Continue A Prelab B1	4	5 Finish A Begin B1	6	7
8	9	10 Cont. B1	11	12 <b>Exp A due &amp; Quiz</b> Finish B1 Begin BII	13	14
15	16	17 <b>Quiz B1 (no report)</b> Cont. BII	18	19 Finish BII Begin C - IR lecture	20	21
22	23	24	25	26	27	28

		Cont. C First NMR lecture & problems		<b>Exp B I &amp; BII due &amp; Quiz</b> Cont. C - 2nd NMR lecture & problems	
--	--	---	--	--	--

## OCTOBER 2019

Sun	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	Sept 30	1 Exp C in- Class Exercise Prelab for Exp DE	2	3 Begin Exp DE Fractional distillation Distribute "H" *	4 *	5 * as soon as you receive your H unknown, prepare an NMR sample
6	7	8 <b>Exp C due &amp; Quiz</b> Cont DE GC, ester reflux	9	10 Cont. DE ester reflux, workup	11	12 While waiting for the GC, measure an IR of your H unknown.
13	14	15 Cont DE Workup, distillation, GC	16	17 Finish DE GC/IR/NM R	18	19
20	21	22 <b>MIDTERM (90min)</b> F prelab Use remaining time for any DE work.	23	24 Begin F	25	26

## November 2019

Sund	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	Oct 28	Oct 29	Oct 30	Oct 31	1	2



		Cont F		<b>Exp DE due &amp; quiz</b> Cont. F G prelab		
3	4	5 Finish F G prelab check (must be done the period BEFORE you begin G); prepare for G dist.	6	7 Begin G Distillation (note; no prelab checks; the entire period is needed)	8 Finish F	9
10	<b>11 VETERANS DAY</b>	12 Begin G Distillation (note; no prelab checks; the entire period is needed)	13	14 Cont G Workup (Exp H)#	15	#By this point you should have the NMR, IR, molecular weight
17	18	19 <b>Exp F due &amp; Quiz</b> Cont G	20	21 Cont. G Derivative preparation & workup	22	of your H unknown and started work on your structure!
24	25	26 Cont. G Derivative analysis	<b>27 Non-Instructional Day (NO LABS)</b>	<b>28 THANKS</b>	<b>29 GIVING</b>	

## December 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3 Finish G Spectroscopy Review / Problems	4	5 <b>LAST DAY Exps G &amp; H due &amp; Quiz*</b> Check-out (no lab work)** ** see below	6	
8	<b>9</b>	10 Study	11	12	13	

	<b>NO LABS</b>	Day (no classes)				
	<b>Verify</b>	<b>the date</b>	<b>&amp; time of</b>	<b>your</b>	<b>Final!</b>	

**\*\*On your Checkout Day/Last Lab Day:**

- ALL students must check out by this day, or the Stockroom will do this and charge a significant fee. If you dropped 113A, this also applies to you
- Exp G and H reports are due at the start of the last lab day; no “late” reports will be accepted after this point.

FINAL EXAM: **Final Exam** Wed, Dec 11 (2:45 p.m. to 5:00 p.m.) in the lab room.

**Your Final Exam will be given in your normal lab room. You may bring Pavia (paper copy only, not an electronic version on a computer or electronic device); 113A Class Notes, a basic calculator that cannot connect to the Web (calculators on phones cannot be used). No other books or sources of information, computers or any web-enabled devices are allowed.**