

San José State University
Department of Chemistry
CHEM 113B: Organic Chemistry Lab

Instructor: Dr. David Brook
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Office hours: TTh 0920-1020 and by appointment
Class days/time: Lab: TTh 1030-1320, Lecture: TTh 1330-1420
Final Exam: Tues Dec 16, 0945
Classroom: SCI 139 (lab)
Prerequisites: Chem 113A (with grade of "C" or better; "C-" not acceptable), Chem 112B (may be taken concurrently with instructor's consent), and Chem 120CS (see below). Transfer students should see the instructor and may be asked to provide information on prerequisite courses taken at other institutions (syllabi, coursework, texts, etc).

Faculty Web Page

Copies of the course syllabus and major assignment sheets may be found on my faculty web page accessible through the quick links/faculty web page links on the SJSU home page after the first week of classes.

Messages related to this class will be sent by email. You are responsible for making sure I have an accurate email address for you that you check regularly. Emails to me should use my sjsu email address: david.brook@sjsu.edu, for questions, etc. Please put CHEM113B in the subject line of any emails related to this class Course Description and Goals

From the Catalog:

Continuation of CHEM 113A including more advanced work. Prerequisite: CHEM 113A (or equivalent with grades of "C" or better; "C-" not accepted). Pre/corequisite CHEM 112B

CHEM 113B is a continuation of 113A and includes more advanced techniques used in the synthesis, isolation purification and characterization of organic compounds. Emphasis is on the practical skills and knowledge required to execute multi-step syntheses and to design and/or adapt laboratory procedures rather than follow 'cook-book' procedures. Formal lab reports (following ACS/Journal of Organic Chemistry style) will emphasize writing and communication skills. Specific content is listed in the 'Schedule of experiments, Quizzes and Final'

Attendance of laboratory sessions (TTh 1030-1320) and lectures (T 1330-1420) is mandatory. Frequent absences from the lab will affect your progress in experiments and will

likely have an effect on your final grade. The lectures describe general background and application of spectroscopic techniques used in the class. In general they will not cover problem solving - you are expected to work problems on your own, including those from texts, problem sets and handouts. A problem session (CHEM 190) is held every Monday from (1330-1420) - while this is optional, it is highly recommended since it complements the lectures and illustrates practical applications of the spectroscopic techniques used in the class.

Student Learning Objectives

- Mastering advanced laboratory techniques for manipulation of organic compounds (synthesis, separation, purification)
- Characterization of organic compounds by physical and spectroscopic methods including:
 - *Use of Infrared, 1D and 2D proton NMR and 13C NMR to characterize organic molecules*
 - *Apply mass spectroscopy (exact mass and fragmentation patterns) to organic structural analysis*
 - *Select conditions for GC analysis and analyze gas chromatographic data*
- Maintain useful contemporaneous notes of experimental procedures
- Write original formal laboratory reports in ACS journal style
- Locate scientific data as needed from paper and electronic sources as needed
- Design experimental procedures for new reactions and modify existing procedures as needed
- Operate safely in the laboratory and dispose of waste properly

Required Texts and Items

Texts

Note that exams are open book/note. Consequently electronic versions of texts are not acceptable since you **may not use cell phones or laptops during exams**

- Straus, Lab Notes for Chem 113B (purchase at SAACS in basement of Duncan Hall).
NOTE: you must purchase the current set of notes. Changes have been included this semester, including some relevant to safety. Use of notes from previous semesters will result in a fail for that experiment.
- Silverstein, R. M.; Webster, F. X.; Kiemle, D. J.; Spectrometric Identification of Organic Compounds, 7th ed. 2005
- Pavia, D.L.; Lampman, G.M.; Kriz, G.S. Introduction to Spectroscopy, 3rd ed (multicolor cover)
- American Chemical Society, the ACS style guide

Other equipment requirements

- Lab Notebook (that allows for duplicate pages)
- A set of molecular models.
- Pencils, Ruler, Calculator (Since you may not use cell phones or laptops on exams, you will need a calculator)

Lab Notebooks

The preliminary write-up of all notes and observations 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! **RECORD ALL OF YOUR NOTES AND OBSERVATIONS IN DIRECTLY IN YOUR NOTEBOOK, AS THEY OCCUR.** Don't use scraps of paper; don't memorize measurements. The main point of the notebook is to be a journal of you laboratory activities so that you, or someone else, can read it at a later date and fully understand what you did, how you did it, and why things came out the way they did. It's OK to correct entries by drawing a line through them. The main point is that it is organized and understandable. *In CHM113B one component of your grade will be based on your notebook!*

Lab Reports

The formal report must be in the style of a "Journal of Organic Chemistry" article - see the ACS style guide and any issue of JOC for details and examples. The report must be typewritten and double spaced. **It must also be submitted to 'turnitin.com' (class id 8485941, password ochemlab2).** You may find it useful to include chemical structures within your report. Free chemical drawing software for windows can be found at <http://www.acdlabs.com> ("Chemsketch) and <http://www.mdli.com> ("Isisdraw"). Other packages include MarvinSketch and Chemdoodle. One of the most commonly used chemical drawing packages is ChemDraw (<http://www.cambridgesoft.com>) but it is not free (\$150 for an academic license for the standard edition, slightly less for academic licenses that expire after 1 month or 1 year)

As with a published paper, the formal lab report should be written so that someone with a basic understanding of organic chemistry will be able to understand your experimental procedure, results and conclusions and be able to reproduce your experiment. Pay particular attention to the discussion points in the experimental handout provided.

In addition to the formal report you must also turn in:

- 1) The yellow copy pages from your notebook
- 2) Appropriately labeled and interpreted spectra

Submit these items together in a manilla folder with your name on it, keeping items 1-2 stapled separately. (Do not staple everything together in one massive packet)

Schedule of Experiments

Experiments and due dates are given in the "Schedule of Experiments" handout. Note that the lab report and all supplementary material are due at the beginning of the lab period for the specific "due date." A detailed prelab lecture about each experiment will be given on or before the "start date" of each experiment. In addition, supplemental lectures may be given as needed. The Schedule is subject to change and changes will be announced in class.

Preparation

A major requirement for success in Chem 113B is advanced preparation. This means you should read the experimental background and procedures carefully before the lab period. Since many of the experiments use more than one text, or multiple sections of a text, one suggestion is to photocopy the most important part of the procedures and have this as a ready reference (especially if only a few pages are involved).

You will be given the starting material for each experiment only after the instructor checks both your preliminary writeup in your notebook, and the table of reagents and products. Your starting material will be provided to you in a vial, which you will swap for an empty vial. If you need a second sample of starting material, you may be assessed a penalty. ***Note that you MUST have your preliminary writeup and table of reagents and products completed BEFORE you will be given any starting material.*** Obviously, if you have to work on these items during the scheduled lab period, you will seriously deprive yourself of adequate bench time to complete the experiment. A less obvious benefit of advanced planning will be that you may be able to use time during long procedures (e.g. refluxing) to perform other aspects of the experiment to catch up or get ahead. The lab schedule is arranged so there should be adequate time to complete each experiment well within the allotted dates.

Grading

The final course grade will be based on the total score of assignments over the semester:

5 experiments @ 10% each	50%
(8% report and 2% quiz)	
5 spectroscopy quizzes @ 4% each**	20%
Final exam	30%
Total	100%

** A total of 5 spectroscopy quizzes will be given during the Tuesday 1:30 PM class periods (see schedule).

No reports will be accepted after the final exam date.

Letter grades will be assigned to each lab report, the **total** score of the spectroscopy quizzes and the final exam. The final course grade will be a weighted average of these letter grades. The instructor may raise the final course grade by 0.33 grade point (eg., from B+ to A-) based on excellent preparation and laboratory work. A "bell curve" is not used to determine grades.

It is mandatory that all five Formal Reports be turned in (even if late) in order to receive a passing grade for CHEM 113B. All quizzes and the final exam are open to notes and textbooks used for CHEM 113B. Each student must have his/her own set (no sharing during quizzes and exams).

Attendance at all lab meetings will obviously be essential for you to complete the experiments. In general, work outside of the scheduled lab time will not be allowed except in unusual circumstances (e.g. medical absence, with verification). Any request for special circumstances must be accompanied with a verifiable document (e.g. doctor's note).

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 acknowledgment that you have all of your equipment. You are responsible for keeping track of all of the contents of your drawer. If you lose or break any item, you will be assessed a breakage 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! No one can help you if something is lost or broken, so be careful! 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 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 use your code!

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.

Safety

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

- Attend the safety lecture (first lab meeting) and
- View the Safety film.
- Read the Safety Rules for Teaching Laboratories on the chemistry department website
- Pass a short quiz on laboratory safety (grade of 80% or above)

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

In addition to the points covered above, these are especially worth emphasizing:

- ALWAYS WEAR SAFETY GOGGLES IN THE LAB!!! (over your eyes, not on your forehead!)
- 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
- 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).
- Glassware breaks. Use caution in any experimental procedure, and exchange any chipped or cracked glassware. Also, dispose of all glassware in the special bins, not in the trash cans!
- The texts have sidebars or highlighted sections outlining special safety precautions - always enter these into your procedure section in your notebook (another reason to read ahead!)
- 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.
- 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 instructors directions. Familiarize yourself with the safety rules for teaching labs on the chemistry department website. Note in particular: "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 the Varian Mercury 300 NMR and the HP GCD and other instruments. These will be provided by the instructor.

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 may be disenrolled from the class!

Chemical Safety (CHEM 120S)

Chemistry 120S (Chemical Safety) is a required course for all chemistry majors and minors, and a prerequisite for all students involved in Chemistry 180 or 298 research courses.

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 CHEMISTRY 114

If you plan to take Chem 114 in the Fall of 2006 or later, 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

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](http://www.sjsu.edu/provost/services/academic_calendars/) at http://www.sjsu.edu/provost/services/academic_calendars/. The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

Consent for Recording of Class and Public Sharing of Instructor Material

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

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. 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.”
 - It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
 - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- “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.”

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](http://www.sjsu.edu/senate/docs/S07-2.pdf) at <http://www.sjsu.edu/senate/docs/S07-2.pdf> requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.

In 2013, the Disability Resource Center changed its name to be known as the Accessible Education Center, to incorporate a philosophy of accessible education for students with disabilities. The new name change reflects the broad scope of attention and support to SJSU students with disabilities and the University's continued advocacy and commitment to increasing accessibility and inclusivity on campus.