

# Chemistry 232 Laboratory Schedule

## Additional Information/Schedule

### Fall 2020

**Due to COVID-19 Pandemic:** Chem 232 will be ran as a 50% F2F course with the other 50% of the curriculum being asynchronous mode. The class will be broken into 2 cohorts. The week before the lab begins your TA will contact your SDSU email to inform you which cohort you are in. The cohorts will meet in the lab on alternating week according to the schedule included at the end of the syllabus. On weeks when your cohort does not meet in the lab there will be assigned virtual asynchronous lab modules wherein you will watch a video of an experiment being performed, and be given data from your TA to complete a mock lab report. **\*\*\*It is essential you know which cohort you are in to ensure adequate social distancing\*\*\***

**This Course will be administered on Canvas:** All the pertinent material from the lab manual (including safety info and F2F lab modules and procedures) are posted on canvas. **\*\*\*All pre-lab lectures and quizzes will be posted on canvas AND MUST BE COMPLETED prior to the start of a given F2F lab module for your Cohort\*\*\*** Please note, that if you have not completed the prelab lecture and quiz, you will not be allowed to do the lab for the day and will lose all associated points.

The virtual asynchronous mock lab modules will also be administered on canvas, including all associated quizzes.

**Laboratory Supplies: You must have for this course:** 1) approved safety goggles (ANSI Z87.1-2003 standard), 2) a blue flame retardant lab coat, 3) a box of nitrile gloves, 4) a dish towel, 5) 3x5" cards, 6) rubber bands, a glass marking pen (sharpie) 7) dish soap, 8) closed-toe shoes that cover the tops of your feet. An excellent cleaning soap for laboratory glassware can be made from a 1:1 mixture of Simple Green™ and Dawn™ detergent, or you can purchase Alconox online. Finally, you must wear appropriate personal protection equipment, goggles/glasses, apron and **non-open shoes** whenever any laboratory work is being conducted by anyone in the lab.

#### **Student Learning Outcomes:**

##### **Through face-to-face learning**

SLO 2.1: Demonstrate the ability to quantify and interpret the reliability of measured physical and chemical properties of molecules and mixtures employing dimensional and appropriate statistical analysis. (Calculations)

SLO 2.2: Demonstrate knowledge of the important techniques employed to synthesize, separate, purify, identify, and quantitate chemical compounds. (Exp Techniques)

SLO 3.1: Develop proficiency with modern instrumentation and techniques used in chemical laboratories (Lab Technique)

SLO 3.2: Demonstrate the ability to read and comprehend a Standard Operating Procedure (SOP)

SLO 3.4: Develop knowledge of proper and safe chemical use, storage and disposal. (Safety)

##### **Through virtual learning**

SLO 1.4 Describe how the macromolecular properties of matter are determined by the molecular characteristics. (molecules to macro (this will be accomplished via spectroscopy modules)

SLO 1.5 Predict the outcome of, and describe the mechanisms for, various chemical reactions. (Reactions)

**Safety:** You must carefully read and review the safety information posted on Canvas. You will also be expected to watch the posted safety lecture video and complete the safety quiz the week of lab-checkin. Also, read the safety rules attached to your glassware inventory sheet, sign and return this sheet before you can begin any work in this course. There is **no compromise** regarding the safety rules. You must wear appropriate personal protective equipment whenever experimental work is being done. At the minimum these are goggles or safety glasses (ANSI Z87.1-2003 standard), full length lab apron and shoes or boots that completely cover your feet, or splash resistant booties. These items can be purchased from Grainger or the campus store. These items must be worn whenever any laboratory work

is being done in the lab, whether done by you or anyone else. Visitors are not permitted in the lab. You are not allowed to bring or consume any food or drinks in the laboratory. Failure to follow these rules will cost you points and may result in expulsion from the laboratory. All chemical wastes must be disposed properly. Information regarding proper disposal of chemicals is found throughout the laboratory manual.

**You must be prepared in advance for each laboratory meeting:** You will not be allowed to begin experimental work prior to completion of the online pre-lab quiz. **\*\*\*There will be no in-lab lectures to ensure social distancing, so watching the posted pre-lab videos is crucial\*\*\*** If you have not completed the pre-lab quiz, you will not be allowed in the laboratory.

**Laboratory Notebook and Reports:** Your laboratory notebook must be complete and up-to-date. You may use the same notebook you used for Chemistry 200/201. A preliminary write up is required, using the format shown on page 1-4 in the techniques section posted on canvas. Preparative experiments must include tables, the correct limiting reagent, waste disposal and be initialed by your laboratory instructor before he/she will issue any chemical(s) from the storeroom. Once your instructor checks your notebook, give him/her a clean screw-cap vial to exchange for one that has been pre-filled with your limiting reagent. Make sure to transfer its contents as completely as possible into your reaction vessel. We suggest that you record the weight of material received. In most reactions you will turn in synthesized products in screw cap bottles. The bottle must be correctly labeled as follows:

Your name
Compound name
Weight of product in grams and % yield
BP or MP
Day and time of the lab section

and is to be submitted with a 3×5 card containing the following information(see next page):

Your name
Compound name
Weight of product in grams, theoretical and % yield calculations
Day and time of the lab section
Comments:

**\*\*\*After each lab, you will be expected to obtain a proton NMR spectra of your product and assign the peaks in the spectra to the protons in your molecule. This should be emailed to your TA the week the lab is due.\*\*\*** After the samples have been evaluated, the empty vial will be returned to you. Recall that you must have 10 vials in your locker at end of semester. At the end of each laboratory session, room 502 will be cleaned up by the last two remaining students beyond the end of the normal class time. They will be responsible for disposing of paper waste, standing water, etc.

Laboratory notebooks must be handwritten in pen and should not contain loose notes or papers, except for spectra. Complete documentation of all your observations is required. Neatness is nice but all observations should be made directly into your notebook during the lab, in pen. It is required that you write out what you intend to do prior to the beginning of the lab, indicating the important steps. As you do these steps, enter your observations and any adjustments directly into the notebook. If an error is made, place a single line through the error and write the correct information either above or behind it. All errors must be legible for your notebook to be scientifically permissible. NO WHITEOUT.

**Grading:** A large percentage of the points in the laboratory are devoted to the quizzes. It is imperative that you are well prepared for the six quizzes which will cover fundamental information on the experiments and yield calculations. **Quizzes are to be completed on canvas prior to coming to lab.** The experiments are graded on both purity and

yield of material. If you can not turn in any product, but you have done the experiment you will be given a minimum score of 10 points. You will also be evaluated (20 points) on your notebook, lab technique, preparedness, attitude, proper disposal of chemicals and general safety.

### Laboratory Grading Scale:

1 Functional group assignment @ 50 points	50
6 lab related online quizzes @ 25 pts each	150
3 F2F experiments @ 100 pts each	300
2 virtual mock labs @ 50 pts each	100
1 NMR module @ 100 pts each, 1 MS/IR module @ 50	150
Lab notebook and technique	50
Total points for laboratory	800

### Schedule:

F2F Activities are highlighted in blue. Other activities will be carried out in an asynchronous & virtual.

Week (date)	Cohort 1 (10-11 students)	cohort 2 (10-11 students)
1 (8/24-8/27)	check-in (1st half of class) Virtual lecture.quiz on Safety/functional groups on canvas	check-in (2nd half of class) Virtual lecture.quiz on Safety/functional groups on canvas
2 (8/31-9/3)	Recrystallization lab (prelab lecture and quiz must be completed before hand)	virtual lab on distillation (including quiz and mock lab report)
3 (9/8-9/10, 9/14)	virtual lab on distillation (including quiz and mock lab report) Functional group assignment due	Recrystallization-1 (prelab lecture and quiz must be completed before hand) Functional group assignment due
4 (9/15-9/17, 9/21)	Finish recrystallization lab	virtual lab on Acid/Base extraction (including quiz and mock lab report)
5 (9/22-9/24,9/28)	virtual lab on Acid/Base extraction (including quiz and mock lab report)	Finish recrystallization lab
6 (9/29-10/1, 10/5)	Cyclohexene lab-1 (prelab lecture and quiz must be completed before hand)	catchup week
7 (10/6-10/8, 10/12)	catchup week	Cyclohexene lab-1 (prelab lecture and quiz must be completed before hand)
8 (10/13-10/15, 10/19)	Cyclohexene lab-2	IR/MS module
9 (10/20-10/22, 10/26)	IR/MS module	Cyclohexene lab-2
10 (10/27-10/29, 11/2)	Butyl Bromide-1(prelab lecture and quiz must be completed before hand)	NMR module
11 (11/3-11/5, 11/9)	NMR module	Butyl Bromide-1(prelab lecture and quiz must be completed before hand)
12 (11/10-11/12, 11/16)	Butyl Bromide-2	catch up week
13 (11/17-11/19, 11/23)	catch up week	Butyl Bromide-2
14 (11/30-12/3)	checkout (1st half)	Checkout (2nd half)
15 (12/7-12/10)	all outstanding work due	all out standing work due