

# Chemistry 232 Laboratory Schedule Syllabus and Additional Information Spring 2021

**Due to COVID-19 Pandemic:** Chem 232 laboratory will be somewhat less than 50% face-to-face (F2F) course. The remainder of this class will be taught in a virtual asynchronous mode. Face-to-face component will begin the week of March 1<sup>st</sup>. This class is divided into 2 cohorts. Your Chem 232 section Canvas will list students in cohort 1 and 2 under People. The cohorts will meet in the lab on alternating weeks according to the schedule found at the end of the syllabus. You must arrange for your COVID-19 tests so current tests can be posted to WebPortal before F2F laboratory work. This is the only method that we use. No other method will be accepted! On weeks when your cohort does not meet in the lab there will be assigned virtual asynchronous modules that will focus on the analytical aspect of organic chemistry. If you are ill or test positive, contact your TA for alternative assignments. You will be asked to provide documentation. **DO NOT** come to campus until you have been medically cleared. **\*\*\*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. **\*\*\*There will be no in-lab lectures to ensure social distancing; it is essential that you watch the pre-lab videos. 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 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, 7) a glass marking pen (sharpie), 8) dish soap, and 9) closed-toed 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, including but not limited to goggles/glasses, blue lab coat, 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 check-in. Also, read the safety rules attached to your glassware inventory sheet, you have to 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), a full-length blue lab coat, 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 pages 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
Lab section and day/time

This is submitted with a 3 × 5 card containing the following information.

Your name
Compound name
Weight of product in grams, theoretical and percent yield calculation
Lab section and day/time
Comments

**\*\*\*After each lab, you will be expected to obtain a proton NMR spectra as well as calculate the percent yield of your product. You will turn this in as a canvas assignment one week after you have completed the lab.\*\*\*** At the end of each laboratory session, room 501 will be cleaned up by the last two remaining students beyond the end of 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 canvas quizzes that 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 cannot 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. The grades in this class are based solely on your performance in your laboratory section using a curve. The average grade in this laboratory is anticipated to be an approximate B or B+. If we are unable to hold F2F laboratory work, grades will be based on completed sections.

**Laboratory Grading Scale:**

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

## Schedule

Week #1 1/25-28	Check-in, safety, virtual lecture, Quiz on Safety/Functional Groups on Canvas	Check-in, safety, virtual lecture, Quiz on Safety/Functional Groups on Canvas
Week #2 2/1-4	IR and Functional Groups	IR and Functional Groups
Week #3 2/8-11	Virtual lab on distillations (including quiz and mock lab report)	Virtual lab on distillations (including quiz and mock lab report)
Week #4 2/15-18	Virtual lab on Acid/Base extraction (including quiz and mock lab report)	Virtual lab on Acid/Base extraction
Week #5 2/22-25	Virtual MS module	Virtual MS module
Week #6 3/1-4	Recrystallization lab (prelab lecture and must be completed before F2F lab)	Virtual NMR module
Week #7 3/9-15	Virtual NMR module	Recrystallization lab (prelab lecture and must be completed before F2F lab)
Week #8 3/16-22	Butyl Bromide 1 (prelab lecture and quiz must be complete before F2F)	Virtual NMR module
Week #9 3/23-29	Virtual NMR module	Butyl Bromide 1 (prelab lecture and quiz must be complete before F2F))
Week #10 4/1-7	Butyl Bromide lab 2	Virtual Cyclohexene preparation lab
Week #11 4/8-14	Virtual Cyclohexene preparation lab	Butyl Bromide lab 2
Week #12 4/19-22	Catch up week	Catch up week
Week #13 4/26-29	Checkout (1 <sup>st</sup> half)	Checkout (2 <sup>nd</sup> half)
Week #14 5/3-6	All outstanding work due	All outstanding work due

Color codes, Lab week does not start on Monday, Work done in lab, Virtual Zoom Lecture, Reports due

**\*\*\*If you have any questions about the syllabus, please feel free to e-mail your TA, or the lab coordinator Dr. Cole.\*\*\***