

CHEM 2315 – Organic Chemistry Laboratory I

Syllabus

Instructor: Dr. Shawn M. Miller

Fall Term, 2016

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Office Hours: Tu/Th 10:00 AM

Widtsoe 339

Prerequisite:

CHEM 1210 and Chem 1215

Required Materials:

Lab Notebook: Self-Copying Student Laboratory Notebook (ISBN: 9781930882232).

Lab Goggles: Available at Campus Bookstore.

Safety glasses (even with side-shields) are unacceptable.

Lab Coat: Must cover arms to wrists and legs to knees, available at Campus Bookstore.

Lab aprons are unacceptable.

Calculator: A non-programmable scientific calculator is recommended for use in lab. Other electronic devices, including phones, are not permitted in lab.

Lab Fees: The lab fee of \$75 is used to maintain and purchase equipment, purchase reagents and supplies, and partially fund Teaching Assistant stipends.

Course Overview

Chem 2315 is a laboratory course that is designed to accompany Chem 2310 and reinforce the concepts presented in Chem 2310 via practical experimentation.

Course Objectives

CHEM 2315 is a technical course designed to provide you with an opportunity to learn about molecular modeling and the properties, syntheses, separation, purification, and identification of organic compounds. In lab, you will conduct experiments designed to introduce you to these experimental techniques. Additionally, this course will provide you with the opportunity to learn how to properly keep records of your scientific research in a laboratory notebook, a valuable skill that is required in many scientific disciplines. You are expected to carefully and efficiently perform the assigned experiments in the lab, but you are also expected to understand the principles behind these experiments.

By the end of this course, you will be able to...

- ...explain the theory behind standard organic chemistry laboratory techniques and instruments.

- ...predict the outcome of an experiment using knowledge of the theory behind the experiment.
- ...execute basic organic chemistry laboratory procedures safely and efficiently.
- ...record relevant scientific data and observations in a laboratory notebook.
- ...perform arithmetic calculations using recorded scientific data.
- ...create conclusions and justify those conclusions using spectroscopic data or recorded laboratory data.

You will prepare for and practice achieving these objectives by...

- ...reading the Laboratory Experiment handouts.
- ...preparing for lab by completing your Pre-lab Notebook.
- ...attending every lab on time.
- ...being safe in the lab.
- ...asking questions via Piazza, email, and Office Hours.

You will be assessed on how you have achieved these objectives using...

- ...a Getting Started Quiz.
- ...submitted Laboratory Notebook pages.
- ...Laboratory Performance Grades
- ...Lab Cleanliness grades.

Course Communication

For academic questions, rather than emailing questions about course material to the instructor and hope for a quick response, you are strongly encouraged to post your questions on Piazza. The instructor, TAs, and students can answer the question on Piazza, making it more likely that someone can answer your question quickly. Maybe you'll even get lucky and someone will have already asked the question you were going to ask and got it answered! Students are not to provide complete answers or explanations, but are encouraged to guide their fellow students to complete answers or explanations. You have the option of posting anonymously to each other, but the instructor and TAs will always be able to see your identity. Enroll in the course by following the instructions in Canvas or by creating a Piazza account by going to <https://piazza.com/signup>, searching for "Chem 2315", and enrolling as a student.

You are always welcome to e-mail your TA and the instructor with questions. Please include your full name and A-Number in your email. We will attempt to respond to your e-mails in a timely manner, but we have responsibilities outside of the course that may prevent us from doing so, and we ask you to exercise patience after sending e-mail. When contacting the instructor or TAs by email, it is recommended that you use your “myid@usu.edu” address with a descriptive subject line beginning with “CHEM 1220” to avoid your email being filtered as junk mail.

Course announcements will be made using CANVAS and the course Piazza page. Do not expect to receive regular mass emails from the instructor. **You are expected to check CANVAS and/or Piazza at least once a day and are responsible for any information found in the announcements.** “But I did not know” will not be an acceptable excuse for being unaware of important information located in course announcements.

Getting Started in the course

Read the course syllabus, the “Laboratory Notebook Instructions” document on Canvas, and the “Laboratory Safety Agreement Documentation” on Canvas. Your first assessment is a “Getting Started” online quiz located on Canvas that will cover course policy and lab safety as detailed in those resources. Some questions in this Quiz will involve using common sense to make safe decisions. This Quiz opens Monday, September 5 at 8:00 AM and remains open until 8:00 AM on Monday, September 19. The Getting Started quiz will be graded immediately upon completion and may be attempted an unlimited number of times. Correct answers will not be shown upon completion of the Getting Started Quiz, but you will be able to view your responses. If multiple attempts are made, the **latest** score will be accepted. **If you see no score in your Gradebook, no attempt was submitted.** The Getting Started Quiz score cannot be dropped.

Qualified students with disabilities may be eligible for reasonable accommodations. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, 797-2444 voice, 797-0740 TTY. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.

Laboratory Check-in

Laboratory Check-in will introduce you to your TA and the lab space you will work in, assign equipment drawers, and discuss safety information directly relevant to your laboratory workspace. Any student failing to attend the Laboratory Check-in and safety orientation will not be permitted to enter the laboratory space for any laboratory work. If you know that you will be unable to attend Laboratory Check-in, you must give prior notice and documentation to the instructor to make-up Check-in.

Students must come properly attired, as stated here in the course syllabus and in the “Laboratory Safety Agreement Documentation” located on Canvas, bring their safety equipment, and their laboratory notebook. Students will be presented a packet containing an equipment list that will be used to check against what is in their assigned drawer as well as a Safety Quiz and a Safety Scavenger Hunt. All components must be completed prior to leaving the laboratory.

Before the first experiment, you must submit the Chemistry and Biochemistry Department “Laboratory Safety Agreement Documentation” to your TA, or you will not be permitted to perform any experiments. The “Agreement” is available on Canvas for viewing at any time, but a hardcopy will be provided for you at Check-in.

Preparing for Lab

You must read through the pertinent information in the lab handout for the experiment and any supplementary online material before each lecture. For success in this course, you should be an active participant when thinking about the course material and always ask yourself “how and why?” Every step in an experimental procedure is necessary. At each step, you should be able to explain why that particular step is being performed.

Once you have established a firm foundation of what the experiment entails, you must complete a Pre-lab Notebook. **Failing to complete the Pre-lab Notebook will prevent you from performing the experiment, resulting in a score of zero for that experiment.**

Detailed guidelines on preparing and keeping a lab notebook can be found in the “Laboratory Notebook Instructions” document on Canvas.

Performing an Experiment

There are 10 experimental laboratory sessions. Each laboratory session is assigned one experiment worth 40 points and as this is a technical, performance-based course each experiment is mandatory. Make-up experiments for religious obligations and similar scenarios may be possible if the instructor is notified **well in advance**. Due to their sudden nature, make-up experiments are generally not granted for experiments missed due to illnesses or other sudden scenarios. The lowest experiment score during the semester will be dropped, so a single missed experiment will not detrimentally affect your grade. As this is a course with large enrollment numbers, opportunities for a make-up experiment are few even with advance notice. No more than one Experiment can be made-up.

Each TA will give a pre-lab lecture immediately at the start of the laboratory session; therefore, you must arrive to your lab sessions on time. The TA’s pre-lab lectures are critical to your safe and successful performance of each experiment. Arriving late to lab means that you will miss important information pertaining to safe and efficient performance of that day’s experiment. TAs will deduct 5 points from the Lab Performance grade of any student arriving during the TA pre-lab lecture. **Students that miss the TA pre-lab lecture entirely will not be permitted to perform the experiment and will receive a score of zero for the experiment.**

Dry Labs

As shown in the course schedule at the end of this syllabus, some experiments are listed as “dry” labs. These dry labs will not be located in your assigned laboratory room. Instead, you will perform the dry labs in the computer lab in Widtsoe 334. Dry Labs will have Pre-lab Notebooks, but each dry lab will have specific instruction located in the experiment handout. At the beginning of each lab session, your TA will check to see that you have completed the Pre-lab

Notebook. Students who have not completed the Pre-lab Notebook will not be permitted to participate in the laboratory session and will receive a score of zero for the experiment.

Wet Labs

All experiments not labeled “dry” are “wet” experiments that will be performed in your laboratory room. Information and procedures for each experiment are found in handouts on Canvas.

At the beginning of each lab session, your TA will check to see that you have completed the Pre-lab Notebook. Students who have not completed the Pre-lab Notebook will not be permitted to participate in the laboratory session and will receive a score of zero for the experiment. No food or drink is allowed in the laboratory. **Do not bring in water bottles. Do not use cell phones, tablets, or other unauthorized electronic devices in the laboratory.** Only items required to complete the day’s lab will be allowed into the laboratory space.

Safety is the top priority in this course. Details on what is and is not acceptable lab attire are found in the “Laboratory Safety Agreement Documentation” document on Canvas. You must wear a lab coat in the laboratory. You must wear appropriate lab attire under your lab coat, which means being covered from shoulders to toes. Shorts, short skirts, and other clothing that does not completely cover the legs are not allowed, regardless of the weather. Closed toe and closed heel shoes **that cover the top of the feet** must be worn. Due to safety concerns, students who are not appropriately dressed for lab will not be allowed in the lab or allowed to participate in the labs. Students barred from the lab as a result of improper attire will receive a score of zero for the experiment.

Laboratory Performance grades are a measure of your safe and efficient efforts in the laboratory. At the discretion of your TA, your Laboratory Performance grade may be reduced for unsafe or irresponsible conduct in the lab. Penalties may be enforced for tardiness, improper use of personal protective equipment, unsafe technique, improper disposal of waste, failure to clean lab space, or any other behavior or activity that your TA determines to be unsafe, disruptive, or irresponsible. Your TA may choose to dismiss students from the lab for continued unsafe, disruptive, or irresponsible behavior. In such an event, the students will receive a score of zero for the experiment. Laboratory Performance grades cannot be dropped. In the event of an excused absence, the Laboratory Performance grade for that Experiment will be the average of Laboratory Performance grades for all other Experiments. No more than one Laboratory performance score can be made up and Lab Performance grades are not dropped.

You will have only the allotted time of 2 hours and 50 minutes in lab to finish each experiment. **This includes cleaning.** Most experiments will require the majority of the scheduled lab period, so it is important that you come to lab prepared to perform the experiment and that you work efficiently. There should be no instances when you are “doing nothing” in lab. Prepare for what is going to be done next during the periods between the experimental steps. TAs have the authority to instruct you to begin cleaning, even if you have not yet completed the lab, to ensure you leave the lab as scheduled.

Students with health or physical conditions that warrant additional precautions (respiratory ailments, pregnancy, etc.) should contact the instructor *immediately* to discuss their circumstances. Student safety in the laboratory is our top priority.

Post-Lab

Part of being safe includes ensuring the laboratory is clean and organized. At the end of each wet lab period, your TA will grade the cleanliness and organization of the community areas in your lab, such as the weighing balances, waste areas, and sinks, **as a section** out of 5 points. Every student in a lab section will receive the same Lab Cleanliness Grade. This means that if, for example, the area around the weighing balances are messy at the end of lab, you will be penalized even if you did not personally make the mess. Remind each other that it is everyone's responsibility to leave the lab in good condition. Lab Cleanliness grades are not dropped. A rubric for how Lab Cleanliness points are assigned is located on the course Canvas website.

At the end of each lab session, you will remove the perforated notebook pages used that day and submit them to your TA before leaving the lab; you will keep the other copy of your notebook pages in your lab notebook. Your notebook pages will be graded for completeness and correctness, including an appropriate account of the procedure as you actually performed it, all relevant data and observations, calculations, and conclusions.

Academic Integrity

All Utah State University academic integrity policies are strictly enforced. All students at Utah State University agree to be bound by the following Honor Pledge "I pledge, on my honor, to conduct myself with the foremost level of academic integrity." See the following for further information: <https://studentconduct.usu.edu/studentcode/article5>. Students found guilty of academic misconduct on any assignment will, **at minimum, be given a zero for the assignment and have the full value of that assignment deducted from their final course grade**. Actions up to and including a failing grade for the course are options available to the instructor.

Grading

The total score for each type of assignment represent totals after appropriate lowest scores have been dropped.

| | |
|------------------------|-----|
| Getting Started Quiz | 20 |
| Experiment Submissions | 360 |
| Laboratory Performance | 100 |
| Lab Cleanliness | 50 |
| <hr/> | |
| Total points | 530 |

| Percentage of Points Earned | Grade |
|-----------------------------|-------|
| 94 – 100 | A |
| 90 – 93 | A- |
| 87 – 89 | B+ |
| 84 – 86 | B |
| 80 – 83 | B- |
| 77 – 79 | C+ |
| 74 – 76 | C |
| 70 – 73 | C- |
| 67 – 69 | D+ |
| 66 – 60 | D |
| 0 – 59 | F |

Course scores will be rounded to the nearest whole number. Your TA is the instructor of record for all grading related to the laboratory experiments. Questions about lab report point deductions must be addressed directly to your TA. The administration of Chem 2315, including the issuing of grades of Incomplete, will adhere to the outlines in the USU General Catalog.

Fall 2016 Schedule

Please look carefully at the following schedule for the correct order of lectures and laboratory experiments.

| Week # | Week of | Section A (Widtsoe 107) | Section B (Widtsoe 113) |
|--------|---------|--|--|
| 1 | 8/29 | No Lab | No Lab |
| 2 | 9/5 | Lab Check-in | Lab Check-In |
| 3 | 9/12 | Recrystallization | Molecular Modeling and Conformation Analysis (dry) |
| 4 | 9/19 | Molecular Modeling and Conformation Analysis (dry) | Recrystallization |
| 5 | 9/26 | Distillation | Cyclohexane Conformations (dry) |
| 6 | 10/3 | Cyclohexane Conformations (dry) | Distillation |
| 7 | 10/10 | Polarimetry | Chirality (dry) |
| 8 | 10/17 | Fall Break – Monday Labs Only | |
| 9 | 10/24 | Chirality (dry) | Polarimetry |
| 10 | 10/31 | Chemically Active Extraction | Chemically Active Extraction |
| 11 | 11/7 | SN1 and SN2 Reactions of Alkyl Halides | SN1 and SN2 Reactions of Alkyl Halides |
| 12 | 11/14 | Dehydration of Cyclohexanol | Dehydration of Cyclohexanol |
| 13 | 11/21 | Thanksgiving Break – No Labs | |
| 14 | 11/28 | Thin-Layer Chromatography | Thin-Layer Chromatography |
| 15 | 12/5 | Check-out and Final Assignment Return | |