

CHEM 2315 – Organic Chemistry Laboratory I

Syllabus

Instructor: Dr. Shawn M. Miller

Fall Term, 2017

Email: shawn.miller@usu.edu

Office Hours: Tu/Th 12:00 PM – 1:00 PM

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 calculator is recommended for use in lab. Other electronic devices 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 2300/2310 and reinforce the concepts presented in Chem 2300/2310 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 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 and watching the recorded lectures.
- ...preparing for lab by completing your Pre-lab Notebook and Pre-lab Quizzes.
- ...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 and the aforementioned Pre-lab Quizzes.
- ...Laboratory Performance grades
- ...Lab Cleanliness grades.

Course Communication

Piazza is a free online system designed for students to have access to rapid and efficient help from classmates, TAs, and the instructor simultaneously. **Piazza is not to be used to convey personal information.** Email the instructor directly if you need to discuss personal information.

For academic questions, rather than emailing questions about course material to the instructor and hoping for a quick response, you are strongly encouraged to post your questions on Piazza. The instructor, TAs, and your fellow 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 will always be able to see your identity. Enroll in the course by creating a Piazza account by going to <https://piazza.com/signup> or by clicking on the "Piazza" link in the sidebar on Canvas, searching for "Chem 2315", and enrolling as a student.

You are always welcome to e-mail the instructor and/or TA 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 I 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 by email, it is recommended that you send the message through Canvas.

The instructor will hold regular office hours as listed in this syllabus as well as by request.

Course announcements will be made using Canvas and Piazza. You can set Canvas to send you an email when a course announcement is made, but the instructor will not send regular mass reminder emails. **You are expected to check Canvas and/or Piazza at least once a day and are responsible for any information in the announcements.** "But I did not know" will not be an acceptable excuse for being unaware of information 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, August 28 at 8:00 AM and remains open until 8:00 AM on Monday, September 11. 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 Grades, no attempt was submitted.** The Getting Started Quiz score cannot be dropped.

USU welcomes students with disabilities. If you have, or suspect you may have, a physical, mental health, or learning disability that may require accommodations in this course, please contact the Disability Resource Center (DRC) as early in the semester as possible (University Inn #101, 435-797-2444, drc@usu.edu). All disability related accommodations must be approved by the DRC. Once approved, the DRC will coordinate with faculty to provide accommodations.

Laboratory Check-in and Check-out

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 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 including Dry Labs. The “Agreement” is available on Canvas for viewing at any time, but a hardcopy will be provided for you at Check-in.

Check-out follows a similar structure to Check-in. Students will receive their packet containing the equipment list and will be again check against what is in their assigned drawer. 20 points are associated with completing each of Check-in and Check-out.

Preparing for Lab

You must watch the recorded lecture on Canvas and read through the pertinent information in the laboratory handout for the experiment on Canvas and any supplementary online material before each laboratory session. 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.

Each experiment will also have a Pre-lab Quiz located on Canvas. Pre-lab Quizzes are due **one hour** before your laboratory section meets. These Quizzes will contain 5-10 questions with a total value of 10 points. You will have 30 minutes to complete the Pre-lab Quiz and you may use the recorded lectures, the handouts, and your completed Pre-lab Notebook, but you must work alone. The lowest scoring Pre-lab Quiz will be dropped at the end of the course.

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. 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. Policies for dropped scores are listed in the following Dry Lab and Wet Lab sections.

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. No Dry Lab scores are dropped at the end of the course.

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 are 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. The lowest Wet Lab score is dropped the end of the course.

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
Check-in and Safety Agreement	15
Check-out	15
Pre-lab Quizzes	90
Experiment Submissions	360
Laboratory Performance	100
Lab Cleanliness	50
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Total points	650

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 2017 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	8/28	Lab Check-in	Lab Check-in
2	9/4	Labor Day (Monday) – No Labs All Week	
3	9/11	Acid-Base Extraction	Molecular Modeling and Conformation Analysis (dry)
4	9/18	Molecular Modeling and Conformation Analysis (dry)	Acid-Base Extraction
5	9/25	Recrystallization/TLC	Recrystallization/TLC
6	10/2	Absolute Configuration Determination	Chirality (dry)
7	10/9	Chirality (dry)	Absolute Configuration Determination
8	10/16	Fall Break (Friday) – No Labs All Week	
9	10/23	Bromination	Bromination
10	10/30	SN ₁ and SN ₂ Reactions of Alkyl Halides	SN ₁ and SN ₂ Reactions of Alkyl Halides
11	11/6	Distillation	Distillation
12	11/13	Dehydration of Cyclohexanol	Dehydration of Cyclohexanol
13	11/20	Thanksgiving Break – No Labs All Week	
14	11/27	Dehydration of Methylcyclohexanol	Dehydration of Methylcyclohexanol
15	12/4	Check-out and Final Assignment Return	