

# CHEM 2315 – Organic Chemistry Laboratory I

## Syllabus

Instructor: Dr. Shawn M. Miller

## Fall Term, 2019

Email: shawn.miller@usu.edu

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

Widtsoe 339

**Prerequisites:** CHEM 1215  
CHEM 2300 or CHEM 2310 (may be taken concurrently)

### Required Materials:

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

Lab Splash 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.**

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

### Recommended Materials:

Calculator: A calculator is useful for performing calculations in the lab. Other electronic devices, including cell phones, tablets, and laptops, are not permitted in lab.

### 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 train you in molecular modeling and teach the properties, syntheses, separation, purification, and identification of organic compounds. In lab, you will conduct experiments designed to train you to use these experimental techniques and apply those techniques, in conjunction with critical thinking, to solve problems. Additionally, this course will provide you with the opportunity to learn how to record data in an organized fashion and use that data to create and justify conclusions. You are expected to carefully and efficiently perform the assigned experiments in the lab and are also expected to be able to explain 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 provided or recorded scientific 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 a Pre-lab Notebook and a Pre-lab Quiz.
- ...attending every lab on time.
- ...being safe in the lab.
- ...asking questions via Piazza, email, Canvas message, and/or 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.
- ...completion of Laboratory Check-in and Check-out.

### **Course Communication**

**Piazza** is the recommended venue for asking academic questions about the course. Piazza is a free online system that can be accessed directly through Canvas 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.** Contact the instructor directly if you need to discuss personal information such as grades.

When you post a question on Piazza, the instructor, TAs, and your fellow students can all answer the

question making it more likely for you to receive a rapid response compared to emailing one person and hoping they read it soon. Maybe you'll even get lucky and someone will have already asked the question you were going to ask and got it answered! 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 clicking on the "Piazza" link in the sidebar on Canvas and following the instructions there. 3 extra credit points will be awarded to all students who enroll in Piazza regardless of their use of the service provided they enroll by 11:00 PM on the Friday in Week 1 of the term.

You are always welcome to message the instructor with questions. Canvas messages are preferred, but email is fine as well. Please include your full name, A-Number, and the course name in your message. I teach multiple courses and the answers to many questions will depend on the specific course you are in. I will attempt to respond to your messages in a timely manner, but I have responsibilities outside of the course that may prevent me from doing so, and I ask you to exercise patience after sending your message.

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

Course announcements will be made using Canvas. You are expected to check Canvas at least once a day and are responsible for any information in the announcements. "But I did not know" is not an acceptable excuse for being unaware of information in course announcements.

### **Getting started in the course**

Read the course syllabus and watch the Introduction to CHEM 2315 recorded lecture on Canvas. Read the "Laboratory Notebook Instructions" document and watch its associated recorded lecture on Canvas. Read the "Laboratory Safety Agreement Documentation" and watch the associated recorded lecture 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 is due at 11:00 PM on the Friday during Week 1 of the semester. 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](mailto:drc@usu.edu)). All disability related accommodations must be approved by the DRC. Once approved, the DRC will coordinate with faculty to provide accommodations.

Utah State University is committed to providing access for service dog handlers. Due to the unique nature of the laboratory environment service animal handlers must meet with the Disability Resource Center prior to bringing a service dog into the lab. The purpose of this meeting is not to prevent you from having your service animal with you but rather to understand how to best accommodate your needs and the needs of your animal. Please contact the Disability Resource Center at 435-797-2444 or [drc@usu.edu](mailto:drc@usu.edu) to set up an appointment.

## **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 complete experiments of any type and be prevented from entering 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 schedule a make-up Check-in.

Students must come properly attired according to the policies here in the course syllabus and in the “Safety Rules and Training Documentation” located on Canvas, bring their personal 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, a Safety Scavenger Hunt, and some Pre-lab Notebook preparation practice. All components must be completed prior to leaving the laboratory at the end of Check-in.

Before the first experiment, you must submit a signed and dated Department of Chemistry and Biochemistry “Safety Rules and Training Documentation” to your TA or you will not be permitted to perform any experiments of any type. The document is available on Canvas for viewing at any time, but a hardcopy will be provided for you at Check-in. 10 points are awarded for submitting the documentation.

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. 10 points are associated with completing each of Check-in and Check-out.

## **Preparing for Lab**

You must watch the recorded lectures and read the laboratory handout on Canvas for each experiment 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 instructions on preparing and keeping a laboratory 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 **30 minutes** before your laboratory section meets. These Quizzes will contain 10 questions with a total value of 10 points. You may use any notes you have, 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. Answers for the Pre-lab Quizzes will be released after the last section’s due date passes.

## Performing an Experiment

There are 10 experimental laboratory sessions. Each laboratory session is assigned one experiment whose submission is 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. The lowest Experiment Submission score is dropped at the end of the course.

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 3 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 in the experiment handout 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.

### 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, laptops 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 "Safety Rules and Training Documentation" document and associated recorded lecture 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, skirts, and other clothing that does not completely cover the legs are not allowed regardless of the weather. Closed foot shoes must be worn. Students who are not appropriately dressed for lab will not be allowed in the lab or be 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. Each experiment has 5 Laboratory Performance points. 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 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 any low-intensity periods in the laboratory. TAs have the authority to instruct you to begin cleaning, even if it means you will not finish the experiment, 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 Laboratory Cleanliness Grade. This means that if, for example, the areas 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. Laboratory Cleanliness grades are not dropped. A rubric for how Laboratory Cleanliness points are assigned is located on the course Canvas website. In the event of an excused absence, the Laboratory Cleanliness grade for that Experiment will be the average of Laboratory Cleanliness grades for all other Experiments for the student.

If you complete your laboratory submission before the end of the laboratory section, you will remove the perforated notebook pages and submit them to your TA; you will keep the other copy of your notebook pages in your lab notebook. Otherwise, you will submit your notebook pages at the beginning of the next laboratory meeting. **This is a hard deadline and there are no exceptions.** 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.

As students work in pairs and collaborative work is strongly encouraged, there will be significant similarities, particular with regards to recorded data, between the work each student in a pair submits. However, students must still submit their own work. **Copying another student’s Conclusions, or any other section, is plagiarism and an example of an academic integrity violation.** Work together, but do your own work!

## 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. Examples of violations of the academic integrity policies include, but are not limited to, copying the objectives, conclusions, post-lab question answers, and other sections of laboratory notebook submissions of another student including your laboratory partner.

## Grading

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

Getting Started Quiz	20	<table border="1"><thead><tr><th>Percentage of Points Earned</th><th>Grade</th></tr></thead><tbody><tr><td>94 – 100</td><td>A</td></tr><tr><td>90 – 93</td><td>A-</td></tr><tr><td>87 – 89</td><td>B+</td></tr><tr><td>84 – 86</td><td>B</td></tr><tr><td>80 – 83</td><td>B-</td></tr><tr><td>77 – 79</td><td>C+</td></tr><tr><td>74 – 76</td><td>C</td></tr><tr><td>70 – 73</td><td>C-</td></tr><tr><td>67 – 69</td><td>D+</td></tr><tr><td>60 – 66</td><td>D</td></tr><tr><td>0 – 59</td><td>F</td></tr></tbody></table>	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+	60 – 66	D	0 – 59	F
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Check-in	10																									
Safety Training Documentation	10																									
Check-out	10																									
Pre-lab Quizzes	90																									
Experiment Submissions	360																									
Laboratory Performance	50																									
Lab Cleanliness	35																									
<hr/> Total points	<hr/> 585																									

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. In the event of significant differences in TA grading are observed, standardization will be performed to account for the differences.

## Course Assessment

Partway through the semester, the instructor will solicit feedback through optional midterm evaluations on Canvas. The purpose of these surveys will be to determine student opinions of the course and TAs up to that point and ask for suggestions on what could be done to improve the course for the rest of the semester. The instructor will know who completed the survey, but will be unable to match survey responses to students. Each student who responds to the midterm evaluation will be granted extra credit points. At the end of the course, optional end-of-term evaluations of the course and the TAs will be administered through Canvas. The instructor will know who completed the surveys, but will be unable to match survey responses to students. Each student who responds to the end-of-term evaluations will be granted extra credit points.

## Fall 2019 Schedule

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

Week #	Week of	Widtsoe 107	Widtsoe 113
1	8/26	Lab Check-in ( <b>Monday sections only</b> )	
2	9/2	Lab Check-in ( <b>Tuesday, Wednesday, and Thursday sections</b> )	
3	9/9	Separation of an Organic Mixture Part I	
4	9/16	Separation of an Organic Mixture Part II	Conformational Analysis Through Molecular Modeling (dry)
5	9/23	Conformational Analysis Through Molecular Modeling (dry)	Separation of an Organic Mixture Part II
6	9/30	Absolute Configuration Determination of an Alcohol	Molecular Modeling of Chirality (dry)
7	10/7	Molecular Modeling of Chirality (dry)	Absolute Configuration Determination of an Alcohol
8	10/14	<b>Fall Break (Friday) - No Labs All Week</b>	
9	10/21	Distillation of a Mixture	
10	10/28	Substitution Reactions of Alkyl Halides	
11	11/4	Dehydration of Cyclohexanol	
12	11/11	Bromination of an Alkene	
13	11/18	Epoxidation of an Alkene	
14	11/25	<b>Thanksgiving Break - No Labs All Week</b>	
15	12/2	Check-out and Final Assignment Return	