

CHEM 2325 – Organic Chemistry Laboratory II

Syllabus

Instructor: Dr. Shawn M. Miller

Spring Term, 2018

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

Widtsoe 339

Prerequisite:

CHEM 2315

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 2325 is a laboratory course that is designed to accompany Chem 2320 and reinforce the concepts presented in Chem 2320 via practical experimentation.

Course Objectives

CHEM 2325 is a technical course designed to provide you with an opportunity to apply the skills you acquired in Chem 2315 and learn new skills and apply old skills in regards to molecular modeling and the properties, syntheses, separation, purification, and identification of organic compounds. In the laboratory, you will conduct experiments designed to train you in new laboratory techniques and then apply those techniques, as well as techniques learned in Chem 2315, via performing chemical reactions. This course will reinforce the skills you learned in Chem 2315 regarding keeping records of your scientific research in a laboratory notebook and using those records to draw data-supported conclusions through the use of critical thinking, valuable skills that is required in many scientific disciplines. You are expected to carefully and efficiently perform the assigned experiments in the laboratory, 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.
- ...completing Check-in and Check-out.
- ...submitted Laboratory Notebook pages and the aforementioned Pre-lab Quizzes.
- ...Laboratory Professionalism Grades
- ...Laboratory 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 should not be used to convey personal information.** Contact the instructor directly, through Canvas preferably, if you need to discuss personal information, such as grades.

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 get lucky and someone will have already asked the question you were going to ask and got it answered! Students should not 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 course assistants 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 2325", and enrolling as a student.

You are always welcome to message the instructor with questions. Please include your full name, A-Number, and course name in your message. 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. When contacting the instructor, 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" is not 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 and watch the associated introductory recorded videos. Your first assessment is a "Getting Started" online quiz located on Canvas that will cover course policy and laboratory safety as detailed in those resources. Some questions in this Quiz will involve using common sense to make safe decisions and are not explicitly discussed in the preparatory materials. This Quiz opens Monday, January 8 at 8:00 AM and remains open until 8:00 PM on Friday, January 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 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 laboratory 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 the associated safety orientation will not be permitted to complete any Experiments, including Dry Labs that do not require entrance in the laboratory space. 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 to qualify for successful completion of Check-in.

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. 15 points are earned by completing Check-in and Check-out.

Preparing for Lab

You must watch the recorded lecture(s) on Canvas and read the laboratory handout(s) on Canvas for each Experiment. 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 has a Pre-lab Quiz located on Canvas. Pre-lab Quizzes are due **30 minutes** 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 as resources while taking the Pre-lab Quiz, 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 11 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.

Students may not enter their laboratory room until their TA arrives. 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 Professionalism 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. The first two dry labs will be held in your normal laboratory room. The third dry lab will not be located in your assigned laboratory room. Instead, you will perform that dry lab 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 laboratory 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. Students will work in pairs.

At the beginning of each laboratory 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.

Safety is the top priority in this course. Details on what is and is not acceptable laboratory attire are found in the “Laboratory Safety Agreement Documentation” document on Canvas. You must wear a laboratory coat in the laboratory. You must wear appropriate laboratory attire under your laboratory 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 with socks long enough to cover the space between the shoes and bottom of pants or equivalent clothing. 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. No food or drink, including water bottles, is allowed in the laboratory. **Do not use cell phones, tablets, or other unauthorized electronic devices in the laboratory as they are distractions.** Only items required to complete the day’s Experiment are allowed into the laboratory space.

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

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 laboratory 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 laboratory 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 laboratory, such as the weighing balances, waste areas, and sinks, **as a section** out of 5 points. Every student in a laboratory section will receive the same Laboratory 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 laboratory 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.

After each Experiment, you will remove the perforated notebook pages corresponding to the Pre-lab work, observations and data recorded during the Experiment, and the Conclusions and Post-lab Questions and submit them to your TA. You will keep the copy of your notebook pages in your lab notebook for your own records. The deadline to submit your notebook pages is the start of the next time your laboratory section meets. Late submissions will not be accepted. 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. No Dry Lab Experiment grades are dropped at the end of the course. The Lowest Wet Lab Experiment grade will be dropped at the end of the course.

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

The administration of Chem 2325 will adhere strictly to the policies (including the issuing of incompletes) outlined in the USU General Catalog.

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	Percentage of Points Earned	Grade
Check-in and Safety Agreement	15	94 – 100	A
Check-out	15	90 – 93	A-
Experiment Submissions	400	87 – 89	B+
Laboratory Professionalism	110	84 – 86	B
Lab Cleanliness	40	80 – 83	B-
<hr/> Total points	<hr/> 600	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 responsible for all grading related to the laboratory experiments. Questions about laboratory report point deductions must be addressed directly to your TA. The instructor may choose to standardize the **Experiment Submissions scores only** for each lab section independently **if and only if** significant differences in grading are observed between TAs.

Spring 2018 Schedule

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

Week #	Week of	Experiment/Activity
1	01/07	Lab Check-in
2	01/14	Martin Luther King Day (Monday) – No Labs All Week
3	01/21	Introduction to Solving Spectroscopy Problems (dry)
4	01/28	Solving Spectroscopy Problems (dry)
5	02/04	Gas Chromatography
6	02/11	Substituent Effects on Electrophilic Aromatic Substitution
7	02/18	President's Day (Monday) – No Labs All Week
8	02/25	Mixture Separation via Column Chromatography
9	03/04	Spring Break – No Labs All Week
10	03/11	Synthesis of Aspirin Part I
11	03/18	Synthesis of Aspirin Part II
12	03/25	Determining the Reactants in an Aldol Condensation
13	04/01	Oxidation of <i>tert</i> -Butylcyclohexanol
14	04/08	Reduction of Cyclohexanone
15	04/15	Molecular Modeling of Biomolecules (dry)
16	04/22	Check-out and Final Assignment Return