INSTRUCTOR
Dr. Ryan Stolley
Office: HEB 4222
Email: ryan.stolley@utah.edu
Assistant: Dasha Walker, E-mail: daria.walker@utah.edu

OFFICE HOURS
Office hours for Professor Stolley are Tuesday and Wednesday, 10:00 AM – 12:00 PM in HEB 4222.
Your TAs will have office hours in the Organic Chemistry Study Center, 2619 TBBC.
Schedule: http://www.chem.utah.edu/undergraduate/resources/ochem-study.php

TEACHING ASSISTANTS
Lori Digal (loridigal@gmail.com), Jackson Gargaro (jackgargaro@gmail.com), John Kim (email TBA), Alex Motro (motro23@gmail.com), Jordan Liles (liles.jordan@yahoo.com), Changhang Dai (email TBA), Emily Kirkeby (emilykirkeby@gmail.com), Tianhua Tang (tthchem@gmail.com)

COURSE DESCRIPTION
CHEM 2315 introduces students to fundamental organic chemistry laboratory techniques and equipment. It gives students hands-on experience with scientific methods, teaches critical thinking and writing skills, and prepares students for advanced work in chemistry and related science and engineering fields. Emphasis will be on experimental techniques, an understanding of the theory behind the lab experiments, and the documentation and communication of experimental results through writing of scientific reports with correct spelling, grammar, and logic.

PREREQUISITES
CHEM 2310 is a co-requisite (or pre-requisite) for CHEM 2315. CHEM 2315 is a prerequisite for the second-semester laboratory course, CHEM 2325. CHEM 2315 and CHEM 2325 cannot be taken concurrently.

LECTURE
Thursdays, 10:45-11:35, HEB 2008, OR Thursdays, 3:40-4:30, HEB 2004. You may attend either lecture. Lecture attendance is expected and is critical to understanding and preparing for the laboratory class.

TEXT AND MATERIALS
All experimental procedures will be provided on Canvas, there is no need to purchase a book

Lab Notebook (REQUIRED) – Any laboratory book will be fine. I recommend something solid bound so you don’t lose pages. Lab final will be open notebook, so everything should be compiled within it.

COURSE WEBSITE
Canvas: https://learn-uu.uen.org/ The course will be listed on canvas as: CHEM 2315-001 Fall 2019 This general site is maintained by the instructor. Look there to find lecture slides, additional notes all of the experiments, updates and announcements from the instructor.

ASSIGNMENTS & POINT BREAKDOWN
1) Pre-Lab 10 x 10 100
2) Lab Performance 10 x 10 100
3) Data and Observations 10 x 10 100
4) Post-Lab 10 x 15 150
5) Lab Report 2 x 50 100
6) Safety Quiz 1 x 50 50
7) Pre-Lab Quiz 1 x 50 50
8) Lab Final 1 x 100 100

Total 750
Students who miss (and do not make up) three or more labs or do not turn in all corresponding reports will fail the class. The final grades will be assigned as follows. (1) All %’s will be rounded (i.e., 59.4% = 59%, 89.5% = 90%), (2) Letter grades will be given approximately as ≥92% - some flavor of A; 91-85% - some flavor of B; 84-78% - some flavor of C; 77-71% - D. I reserve the right to vary the cut-offs depending on the lab section and on the overall class performance.

**IMPORTANT:** save all your graded reports until the final grades are posted, you checked your final grade and have no plans of disputing it.

Your scores will be available approximately one week after an assignment has been turned in. Please check your grades early and often to ensure that everything has been entered accurately. **IMPORTANT:** Please inform the instructor of concerns regarding the grading of lab assignments early in the semester so that the problem can be addressed.

**ATTENDANCE**

Lecture: Attendance will not be recorded, however there will be critical pieces of information that will affect your grade that can only be obtained in lecture.

Laboratory: Attendance is mandatory however you can make up, up to two (2) labs at another time. If you miss more than two (2) labs you will receive an automatic failing grade.

**PRE-LAB**

It is important that you have read the laboratory experiment in advance and are prepared to begin work. It is your responsibility to read the experimental procedure and background information until you understand the details of the experiment. **To assure your advance preparation you are required to show your pre-lab notebook pages within the first five minutes of lab, otherwise no credit will be given for the prelab.** This prelab will include sections A-E of the notebook record (see below for guidelines). No work is permitted without writing the prelab.

**DATA AND OBSERVATIONS**

During your experiment, it is critical to make detailed and consistent observations. This includes how substances behave, whether you spilled, how long the experiment took etc.

You will be asked to recall these details in the lab final. So being as complete in recording the experience is paramount.

Before you leave the laboratory, you must have your TA check your observations to receive full credit for the experiment.

**LAB PERFORMANCE**

You will be graded each week on the basis of your physical performance in lab. You will earn full credit if you arrive to lab on time, keep your work station clean and containers labeled, come to lab prepared and as a result work efficiently, handle the waste and equipment properly, wear your lab goggles/glasses and appropriate lab attire at all times, maintain a thorough notebook, work safely, and demonstrate high quality lab techniques. **IMPORTANT:** half of your performance points will be deducted if you dispose of glass, solid or liquid waste improperly. **NO CHEMICALS SHOULD BE Poured DOWN THE DRAIN - INCLUDING ACETONE.** The Environment Protection Agency (EPA) defines acetone as a volatile organic compound which exhibits the flammability characteristic of flash point < 140 °F and must therefore be treated as hazardous waste. Rinse your glassware with acetone into a beaker-then dispose of it in the appropriate waste container.

**POST-LAB**

Specific instructions for each post-lab and for the reports will be included in the experimental procedure posted on Canvas.

Post-labs must be written individually, even if the experiment is done with a lab partner and will be submitted on Canvas – via Turnitin.
LAB REPORTS

For labs 6 and 9, you will write more detailed reports based on the data you obtain. More information will be provided about the format of these reports at the appropriate time.

The reports, including answers to any questions or topics your TA assigns, will be collected at the beginning of the next scheduled lab period. Reports 1–5 days overdue will be lowered 10 points for each day they are late. Reports more than 5 days overdue will not be accepted. Reports for the make-up lab will be due one week after you complete the make-up lab.

If you have difficulty writing coherent reports, ask your TA, the instructor or the University Writing Center for help. The writing center is located on the third floor of the Marriott Library. Their phone number is 587-9122, and their website is www.writingcenter.utah.edu/

LAB FINAL EXAM

Your laboratory final exam will be open-note, where your only resource will be your laboratory notebook (no calculators, printouts, etc.). This will test your ability to record detailed notes, observations, and conclusions for each lab. This can be very easy or very hard, depending on the amount of care you have taken in the class overall.

MAKE-UP LABS

Make-up labs are permitted in special circumstances, and should be scheduled ahead of time. The make-up lab should be done that same week, or at the very latest the following week. No make-up labs can be done later than one week after the normally scheduled time, unless special arrangements are made. Please email your TA if you missed the lab. If you cannot attend your regular laboratory section for a legitimate reason, please follow the instruction below:

(1) First, choose a day and time that you are able to make up the lab. See the class schedule on the registrar for section times/locations.
(2) Report to the lab room at the beginning of lab. Introduce yourself to the TA and join a lab group. The TA should grade your pre-lab and sign your notebook pages before you leave the lab.
(3) No later than one week after making up the experiment, staple your lab notebook pages, the conclusion, and the make-up form together, and turn the packet to your TA. You may give your assignment to the TA directly or drop it off in their mailbox (HEB 1504). If the assignment is turned in late, penalties will apply.
(4) You are limited to two make-up labs per semester unless you have extraordinary circumstances.

LABORATORY DETAILS

SAFETY

The following steps will be taken to ensure your safety in the labs. (1) Lab safety will be discussed during the first lecture. (2) Safety documents and videos are posted on Canvas, you are required to review them. (3) A safety quiz will be given on Canvas before your first lab; it will be based on the safety lecture and materials posted on Canvas. Getting fewer than 75% of correct answers will require a discussion with the TA before you will be allowed to continue working in the lab. (4) Safety instructions will be given by the TA before the check-in. You will be required to download and sign a safety rules document before you are allowed to proceed with the labs. (5) MATERIALS SAFETY DATA SHEETS (MSDS) should be consulted for every compound you plan to use prior to lab.

EMERGENCY

Working in a chemistry laboratory has inherent risks, while we will ensure the safest working conditions possible, if an emergency occurs you should contact your TA immediately and, please call University Police at (801) 585-2677 or "911" to report emergency and ask for emergency assistance.
LAB ATTIRE

IMPORTANT! For your own safety, the following are required AT ALL TIMES in lab:
- Goggles or lab glasses, close-toed shoes, short- or long-sleeved shirt, long pants and a cotton lab coat. YOGA-TYPE PANTS WILL NOT BE ALLOWED. Please tie back long hair. If you come to lab wearing inappropriate clothing, you will be sent home, and forfeit your laboratory time. If a large amount of the lab is missed you will be required to attend a make-up session. We recommend that you keep extra shoes and long pants in your locker.

GLOVE POLICY

Gloves are recommended for all experiments and required when handling chemicals. Free gloves will be available from the stockroom. Gloves should not be worn outside of the lab. Gloves keep chemicals off your skin but can cross-contaminate anything you touch with your gloved hand, i.e. phones, laptop, and doorknobs.

WASH HANDS

All students are REQUIRED to wash their hands as a safety precaution before leaving the laboratory in case they have accidentally encountered any dangerous chemicals. GLOVES ARE ONLY A FIRST LINE OF PROTECTION.

REMOVAL OF CHEMICALS, WASTE, OR EQUIPMENT

It is forbidden to remove ANY chemicals, solvent, chemical waste, or equipment from the organic chemistry teaching laboratories or stockroom. Do not take any chemicals or waste home with you when you leave. This is considered to be theft of property that belongs to the University of Utah. It is especially important that you dispose of solid and liquid chemical waste in the containers in the laboratories. Once a chemical has been placed into a container labeled "WASTE", that material must be stored, transported, and disposed of by the University in accordance with complex Federal regulations that are specified in Title 40 of the Code of Federal Regulations (40 CFR) and in related federal and state regulations and law.

WASTE

Chemical waste is assumed to be hazardous and all waste streams need to be accounted for. Mixing incompatible waste can result in explosion, release of toxic gasses and other hazards. Waste streams will include but are not limited to Aqueous Waste, Organic Waste, Metal Waste, and Solid Waste, and non-hazardous trash. Waste streams will be well indicated and it is your responsibility to be aware of the appropriate waste stream you need to use. Failure to use the appropriate waste stream can result in your immediate expulsion from class.

EQUIPMENT

You are accountable for the equipment in your organic chemistry locker. On the first day of lab, your teaching assistant will assign a locker to you. Make sure to put a combination lock on the locker as you may be penalized for the replacement of missing items later during the semester.

Located inside your equipment locker is a breakage card listing the entire contents of the drawer. At check in, verify all items against the list. If anything is missing, the stockroom attendant will replace the item. During the semester, when you lose or break an item, the stockroom attendant will punch the card next to the item name to indicate that they have replaced the item. At the end of the semester, you may be assessed a grade point penalty based upon any breakage or loss in excess of that amount covered by your special course fee. Be careful with your equipment and do not lose the breakage card.

We will also be using common equipment like a glovebox, chromatography columns, and separation funnels. These are particularly sensitive and expensive equipment. Please use caution when using this equipment.

Your laboratory fee is used primarily to cover the cost of chemicals and materials you use during the semester. It also includes a small component for small items in your drawer that are occasionally broken or lost. It does not cover breakage of special, major equipment that is not part of your equipment locker. When carrying out
Accurate record keeping is essential to many fields including chemistry. Doctors are required to take accurate, meticulous notes when speaking with patients to guarantee proper medical care; an accountant must keep a carefully detailed record of each transaction to avoid hassle with the IRS; a lawyer’s notes must be thorough and complete to avoid misinformation being presented at a trial. Likewise, the lab notebook is a permanent record of a chemist’s laboratory activities. Chemists often refer to their notebooks when applying for patents and writing scientific papers, and when formulating conclusions before moving forward with a research project. Additionally, the lab notebook is used as evidence when a company is taken to court. Because of these significant implications it is important to learn data collection techniques that prepare you for your future, regardless of your specific field of study. In chemistry 2315 careful record-keeping will be encouraged and enforced.

The goal when writing in your laboratory notebook should be to write clearly enough and with sufficient organization and detail such that someone unfamiliar with the subject would be able to repeat your experiment exactly and obtain the same results using only your notebook. The following general guidelines should be followed:

1. You are required to purchase a dedicated laboratory notebook that will allow you to record experimental details.
2. Leave the first two pages of your notebook blank and make a table of contents.
3. Come to lab prepared! Items A-E must be done before you come to the lab and will be graded by the TA. The following items can be completed in lab and after class.
4. Write directly into your notebook – NOT on a separate sheet of paper (this includes your Pre- and post-labs). To encourage formation of good habits your TA will sign your notebook pages before you leave lab each day. All procedural information and observations must be recorded before obtaining a signature.
5. Write in pen only, NOT pencil. Do not erase or use whiteout. Make corrections by drawing a single line through the mistake.
6. Write neatly and leave a lot of white space! If someone is to repeat your work they have to be able to read it and follow your organization. The use of tables is highly recommended.
7. Permanently attach any graph/spectra that are generated to the notebook with tape or staples.
8. Your notebook is a permanent record, if there are concerns over academic dishonesty this will be the only way to assess what you have done.

You must follow the format presented below for your notebook entry. It is recommended you use the left side of the page for outlining procedures and the right side for observations.

A. Title of the experiment
B. Purpose/Goal of the experiment this is a brief description of why you are performing the experiment.
C. Provide a Hypothesis – Predict what will happen and explain why.
D. Molecular structures or reactions. Also include the following physical data for all reactants used and products produced and solvents (with literature references cited): Molecular weights, boiling points (if a liquid) and melting points (if a solid). Write these values below the structures.
E. Mechanism, if it applies. Include the mechanism for each reaction, unless otherwise instructed. Your effort, not accuracy, will be considered as part of the pre-lab points.
F. Brief procedure outline. This procedure will be posted online. You should include an outline of the important main points of the procedure in your notebook and be sure to note any changes to the procedure written in the manual. Rewriting the main steps of the procedure will help you to better understand the experiment and what is expected of you. Unlike Organic I&II
Lab, you will not be provided with procedures, and success will rely on your preparation and notebook. Write this outline on the left side of your notebook page. If new, complex, or interesting experimental set-ups are used draw a picture to convey the set-up.

G. Actual procedure and observations. Include comments about what occurs during the experiment, like color changes, gas evolution, precipitates, etc. Make sure to write in such a manner that a person attempting to reproduce your experiment can do so without getting verbal instructions from you. Be sure to write during the lab as you perform the experiment. Also include things that occurred that were not planned and which may or may not influence your results. Note that authentic description of the actual procedure sometimes demands recording the time. Write these observations on the right side of your notebook page.

H. Calculations - include important calculations (percent yield, etc).

I. Discussion and Conclusions. Summarize briefly your findings. IT IS CRITICAL TO RECORD ANY CONCLUSIONS EITHER POSITIVE OR NEGATIVE AS YOU WILL NEED TO GO BACK AND WRITE UP ALL OF YOUR EXPERIMENTS IN A NARRATIVE FORMAT.

It is important that your conclusions not include procedural details. The conclusion should concentrate on “why” and not “what”, should be scientific and objective, and should not include any personal pronouns (I, we). You should begin the write-up by stating the chemical reaction and its mechanism. You may draw these by hand or use the wonderful chemical drawing software, ChemDraw, available to you in HEB 1000. You will be graded on the accuracy and completeness of your mechanism in the final write-up therefore it is important to ask questions during lab if necessary. Explain why you did certain important things in the reaction procedure (why was a catalyst or a reflux necessary, why was it necessary to have anhydrous conditions, why was an extraction or recrystallization or cooling necessary, etc). What did some of your observations indicate about the reactions that were occurring? How were impurities, by-products, and unreacted starting materials removed during the work-up?

Use your results as evidence to tell a story that culminates in your major conclusions. Be sure to evaluate your confidence in the results. Important note here: any organic chemist can tell you that following a written, published procedure is no guarantee that you will actually get the product you set out to make. Therefore, treat all products isolated or synthesized as unknowns. Prove to your TA the true identity of the product(s). Give your percent yield and show how you did your calculation (indicating limiting reagent). Does your data (mp, optical activity, IR, NMR) agree with the accepted (literature) values? Always be sure to include the literature value and reference the source. Discuss the quantity and purity of your product, and do an error analysis on your results if you had problems. Explain the possible sources of a low yield or impurities and what you would do differently if you were to repeat the experiment. You should emphasize concepts in your write-up that were emphasized in the lab lecture. Your TA will also give you an indication each week of important concepts that you should include in your write-up.

If you use a reference for your conclusion, be sure to indicate it. Plagiarism in the conclusion is unethical and will result in a failure on the entire write-up.

CHECK-OUT

Check-out will occur at the end of the last lab. You are required to clean all your glassware and review the glassware with your TA. The entire section will also be responsible for cleaning the common areas of the lab. Failure to check out will result in your grade being lowered by single chromatic variant (e.g. an A- to a B+).

PHYSICAL CONSTANTS

Physical constants of chemical compounds (mw, d, etc.) can be found online at chemfinder.com, websites of chemical supply companies such as Millipore-Sigma,
Acros Organics, or Strem (inorganic/organometallic compounds), or in hard copies of the Merck Index and the Chemical Rubber Company Handbook of Chemistry and Physics in the Science Reserve desk on the fourth floor of the Marriott Library. To find the electronic edition of the CRC go to http://www.lib.utah.edu > research tools > article database > C (or same route for the electronic edition of the Merck).

**ACADEMIC HONESTY**

**All students are expected to act honestly in the course.** By submitting an assignment, you are representing that it is your own work and that you have followed the rules associated with the assignment. Any and all cases of suspected academic dishonesty such as cheating, plagiarizing, or misrepresenting one’s work will be dealt with severely, in accordance with the Student Code: http://www.admin.utah.edu/ppmanual/8/8-10.html. A few specific guidelines are given below. If you have questions about what is acceptable please ask!

- All work in the lab notebook and lab reports must belong to the student alone. It should be completed by the individual and everything should be in the student’s own words. Each student should record his/her own data as the experiment progresses and must complete any analysis individually. NOTEBOOKS ARE SUBJECT TO RANDOM CHECKS.

- Students are encouraged to discuss results and conclusions to more fully understand the experiment, however all written work (recording of data, observations, etc. in the lab notebook, and all work on reports) should be done individually, even when working in groups. This means that reports may contain similar ideas, but everything should be presented in your own words and formatting.

**DISABILITIES**

Any student needing special consideration because of a disability should contact the Center for Disability Services, 162 Olpin Union Building, 581-5020. Contact Professor Stolley if you need help as well.

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.

All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

**PREGNANCY**

A student who is pregnant may wish to consult her physician about the safety of taking a laboratory class that requires the routine handling of organic compounds and organic solvents. A student who is pregnant may wish to delay taking organic laboratory courses until the pregnancy is completed.

**SEXUAL MISCONDUCT**

Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

**WELLNESS**

Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student’s ability to succeed and thrive at
the University of Utah. For helpful resources contact the Center for Student Wellness at www.wellness.utah.edu or 801-581-7776.

DISCLAIMER

This syllabus is meant to serve as an outline and guide for our course. Please note that I may modify it with reasonable notice to you. I may also modify the Course Schedule to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas under Announcements.