

**CHEM 2315 ORGANIC CHEMISTRY I LABORATORY  
SYLLABUS – SPRING 2013**

- INSTRUCTOR:** Professor Ilya Zharov  
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- COURSE DESCRIPTION:** Chem 2315 introduces students to fundamental organic chemistry laboratory techniques and equipment. It gives students hands-on experience with the 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 writing of scientific reports with correct spelling, grammar, and logic.
- PRE-, CO-REQUISITES:** 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:** Monday, 2:00-2:50 PM, N-HEB 2008.
- OFFICE HOURS:** Office hours for Professor Zharov are Monday, 1:00-2:00 PM, in S-HEB 3416. Your TAs will have separate office hours in N-HEB 3102. These will be posted on Canvas.
- TEXTS AND MATERIALS:** ***Organic Chemistry laboratory, Chemistry 2315 (REQUIRED)***  
Authors: William W. Epstein; Jimmy L. Seidel; Craig S. Young  
Published by Hayden-McNeil, ©2013. ISBN: 978-0-7380-5336-3
- Lab Notebook (REQUIRED)***  
Customized Lab Record by Hayden-McNeil, or similar bound notebook with carbon copies. **You can buy this from ChemSAC after lecture on January 7 and 14 at a discounted price.**
- Turning Point Clicker (REQUIRED)***  
Other brands of clickers will not work. Watch for more information on how to register your clicker for this course.
- The Organic Chemistry Lab Survival Manual (OPTIONAL)***  
Author: James W. Zubrick  
Published by John Wiley & Sons.
- COURSE WEBSITES:** Canvas: <https://learn-uu.uen.org/> The course will be listed on canvas as: **CHEM 2315-001, Spring 2013**. This general site is maintained by the instructor. Look there to find some of the experiments (#5, 6, 7 and 9), updates and announcements from the instructor. Please check in this document or on the website before sending an email inquiry if answer can be readily found elsewhere.  
**CHEM 2315-0XX Spring 2013**, where X is your section number. This site is maintained by your teaching assistant. Look there to find announcements from your TA and to view your lab grades. You may also email your lab-mates or your teaching assistant from this website.
- TEACHING ASSISTANTS:** The laboratory teaching assistants have full responsibility and authority in the laboratory. Please respect their authority by being responsible. **The TA mailboxes are located in HEB 1504**. Be sure to put your TA's name on anything you submit, keeping in mind that all TAs share the mailboxes.

- STOCKROOM ATTENDANTS: The stockroom personnel have full responsibility and authority over laboratory and stockroom policies and procedures. Please respect their authority.
- CHECK-IN: Check-in will occur during the laboratory period of week 2 of the semester. You are required to bring a combination (not key) lock to share with your lab partner (one lock for two people), goggles, and paper towels. Your lock combination number will be left with the attendant for emergencies. Failing to bring a lock after the second lab will automatically prevent you from doing any further lab work.
- YOU MUST REGISTER FOR THE LAB SECTION THAT YOU PLAN ON ATTENDING. NO EXCEPTIONS. As part of the check-in you must be sure to sign the locker assignment sheet in the lab** (with the correct number for the lab bench you have selected). **If you do not sign the locker assignment sheet, then you are not registered for your lab bench and it may be given to students who register later.**
- SAFETY: A lab safety presentation will be given during the first lecture. Safety instructions will be given by the TA after the check-in. You will be required to sign a safety rules document before you are allowed to proceed with the labs. A safety quiz will be given during the second lecture. While the points obtained for this quiz will be a bonus, getting fewer than 75% of correct answers will require a discussion with the TA before you will be allowed to start working in the lab.
- 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, and pants/shorts/skirt that extend to the knees. A lab coat or apron is highly recommended. Please tie back long hair. If you come to lab wearing inappropriate clothing, you will be sent home. You should change clothes and return as quickly as possible. 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. Each student will be provided with one pair of gloves for each experiment. Free gloves will be available 15 minutes before class until 30 minutes after class begins in the 4<sup>th</sup> floor stockroom. Additional gloves will cost \$0.50/pair. You are welcome to buy and bring your own gloves to lab. The latex or nitrile gloves can be purchased in bulk at many stores, including: Home Depot, Lowes, Harbor Freight Tools, Walgreen's, Rite-Aid and similar stores. Information regarding glove choices: <http://www.chem.duke.edu/safety/>, then choose "The Right Glove for the Job".
- REMOVAL OF CHEMICALS, WASTE, OR LAB 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.
- 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.
- 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.

EXCESSIVE  
BREAKAGE:

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 experiments, work carefully and cautiously. Please be extremely careful with all laboratory equipment.

MAKE-UP LABS:

Make-up labs are permitted in special circumstances. **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.** 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 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 and conclusions, 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.**

POINT  
BREAKDOWN:

1) Pre-Lab Quiz	9 × 15	135
2) Pre-Lab	10 × 10	100
3) Data and observations	10 × 10	100
4) Lab Performance	10 × 10	100
5) Post-Lab	8 × 10	80
6) Post-Lab Quiz	9 × 15	135
6) Lab Report	2 × 25	<u>50</u>
	Total	700

GRADING:

You are expected to complete ten experiments. Persons who miss (and do not make up) two or more labs, do not turn in all corresponding reports, or miss five or more quizzes will receive a grade of C or lower. The final grades will be assigned approximately as follows (all %'s will be rounded, i.e. 59.4%=59%, 89.5%=90%): ≥92% - A; ≥84% - B; ≥76% - C; ≥68% - D. The grades will NOT be curved. I reserve the right to vary the cut-offs depending on the lab section. TAs may vary slightly in their grading, so you will be graded only in comparison to other students in your TA's sections, not in other TAs' sections. **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 *on your section's website*. 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.

**QUIZZES:** Quizzes will be given to show your understanding of the previous experiment (post-lab quiz) and preparation for the current experiment (pre-lab quiz). Two lowest quiz score will be dropped. The quizzes will cover techniques, chemical concepts, mechanism, safety, common calculations like percent and theoretical yield, and your ability to draw conclusion from data from the previous experiment. **Post-lab quizzes will be given in the first 10 minutes of lecture following the lab, and pre-lab quizzes will be given in the last 10 minutes of the lecture.** Because quizzes will be given using clickers, no make-up quizzes will be available.

**LAB NOTEBOOK** For most experiments, you will be evaluated on three items from your lab notebook. During the first 5 minutes of lab, the TA will circulate, looking at your PRE-LAB for the current experiment (worth 10 points). Also at this time, turn in your copies of POST-LAB from the previous week (worth 10 points). Late Post-Labs will be penalized 3 pts/day. At the end of the lab period, turn in the copies from your current experiment that include your Pre-Lab plus the additional changes, Data and Observations recording during lab (worth 10 points). Twice during the semester in place of the Post-Lab write-up you will write formal typed final lab reports (25 points each), see below.

**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, write observations directly into your notebook as the lab proceeds, 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.

**NOTEBOOK GUIDELINES:** 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 the "Customized Lab Record" from ChemSAC (\$12, first two weeks of lecture) or the bookstore. This is a carbonless duplicate set laboratory notebook that will allow you to give one copy of your notebook entry to TA.
- (2) Leave the first two pages of your notebook blank and make a table of contents.

- (3) Items A-E constitute the prelab. **The pre-lab must be done before you come to the lab and will be graded by the TA.** Item F is to be done during the lab, and G and H are to be done at home following the lab.
- (4) *You will submit your notebook pages with pre-lab, data and observations at the end of the lab period and a post-lab set of conclusions one week after performing the experiment.*
- (5) Write directly into your notebook–NOT on a separate sheet of paper. 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.
- (6) *Write in pen only, NOT pencil.* Do not erase or use whiteout. Make corrections by drawing a single line through the mistake.
- (7) 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.
- (8) Permanently attach any graph/spectra that are generated to the notebook with tape or staples.

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. Molecular structures or reactions**

**C. Mechanism (lab 5, 7, 8-10), 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.

**D. Physical data for all reactants used and products produced and solvents** (with literature references cited) with appropriate precautions (when using dangerous chemicals such as sulfuric acid). DO NOT fill in the amounts used. These should be the actual amounts measured out in lab.

**E. Brief procedure outline.** This procedure is usually given in detail in the lab manual. Therefore the procedural details should be referenced. For example: *See Organic Chemistry Laboratory Experiments and Technique – Experiment Name, page XX for the detailed procedure.* You should still 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. Avoid copying the text of the manual word for word. *Write this outline on the left side of your notebook page.*

**F. 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.*

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

**H. Discussion and Conclusions.** Summarize briefly your findings (see below for more details).

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 above). No work is permitted without writing the prelab.

PHYSICAL

Physical constants can be found in the chemical catalogs available in HEB 3102, online at

- CONSTANTS: chemfinder.com, and 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 Marriot 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).
- POST-LAB: After an experiment is complete and before the next lab period, complete the exercise by writing a 0.5-1 page conclusions in your notebook. Copies of these pages will be turned in at the beginning of the next lab period. In general, the conclusions will (a) restate the goals of the experiment, (b) show calculations (yield,  $R_f$ , etc.) required by the procedure, (c) analyze the data obtained as it applies to the experiment, (d) indicate any major problems or deviations from expected results, and (e) answers any specific questions posed related to that experiment. For two of the experiments, a formal written report is required in place of the post-lab. **Specific instructions for each post-lab and for the reports will be posted on Canvas.**
- 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 5 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/](http://www.writingcenter.utah.edu/)
- 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+).**
- DISABILITIES: Any student needing special consideration because of a disability should contact the Center for Disability Services, 162 Olpin Union Building, 581-5020.
- 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.
- 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 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.
- 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, etc.) 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.*

EMERGENCY INFO:

In the event of a personal emergency that impacts your ability to participate in the class, you should contact your TA immediately. If an emergency occurs in the lab, please call University Police at (801) 585-2677 or "911" to report emergency and ask for emergency assistance.