

# Organic Chemistry Laboratory Syllabus

## CHM 2210L & CHM 2211L

**Prerequisites:** All students must have completed CHM 2046 and CHM 2046L (or an approved equivalent at a different institution) with a minimum grade of C-. In addition, students are not permitted to take CHM 2210L and CHM 2211L concurrently, as CHM 2210 and CHM 2210L is the prerequisite for CHM 2211L.

**Required text:** Lehman, John W. *The Student's Lab Companion: Laboratory Techniques for Organic Chemistry*, Pearson/Prentice Hall, Upper Saddle River, New Jersey, **2004** & a carbon copy laboratory notebook as available from the UWF bookstore.

**Laboratory Procedures:** All laboratory experiments will be made available on a website for the course; the appropriate website can be located at [http://www.uwf.edu/chemistry/learning\\_tools.htm](http://www.uwf.edu/chemistry/learning_tools.htm). **You are responsible for downloading and printing the appropriate experiment for each laboratory meeting.** You will not be allowed to begin work unless you have YOUR OWN COPY of the experiment.

**Safety:** Safety glasses/goggles are required in the laboratory at all times. Closed toe shoes are required, no sandals or flip/flops are allowed. Pants (or labcoat) must cover the legs, no shorts. Each experiment must be performed safely and all chemicals must be handled following proper safety and hygiene protocols. This includes proper disposal of all chemical waste generated during the experiment and proper use of safety equipment (gloves, glasses, etc.). A detailed explanation of the required safety protocols is provided in the required text, and will be covered on the first day of class.

**Department Policies:** Additional policies governing the laboratory have been established by the Department of Chemistry, and this information is provided on the course website. These policies will be followed for all laboratory sections.

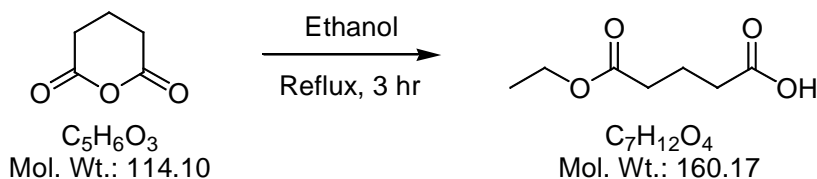
**Make-up Labs:** As explained in the Chemistry Department Policy Statement (previous paragraph), there will be NO makeup labs. If a lab is to be missed, you must notify your instructor by the start of lab on your scheduled day, either by email, in person, or by phone. You may leave a message with the Department Office Manager (850-474-2739). If your absence is deemed an "excused" absence, a written assignment will be given on a similar subject as the laboratory experiment. In addition, you will "borrow" a set of data from a classmate and write a report as if you had been present. It is important to be at every lab session if at all possible. It is the only way that we can work with you to help you learn the chemistry and for you to have the proper laboratory experience.

**Lab Reports:** As a scientist (biologist, chemist or engineer) being able to effectively record your experimental results and observations is essential to your success. In addition, effectively communicating these results to your peers is critical. As such, laboratory reports constitute the largest portion of your grade for this course. The format for your lab reports must follow the guidelines provided below.

Laboratory reports should be written in the format provided below, and will be graded based on the assigned point distribution – each lab report will be evaluated on a 20 or 25 pt scale. The 25 pt scale is used when there are post-lab questions associated with the experiment.

**Format (0-2 pts)** - A (semi-)formal report will be required for each experiment performed. Reports should be written directly into your lab notebook. The carbon copy will be collected and graded; you must ensure that the carbon copy is legible. (Felt-tip pens don't work; ballpoint pens do work.) The reports will be graded on grammar, spelling and content, and should be written using third person, past tense. (*I boiled the solution* is incorrect. *The solution was boiled* is correct.) Very frequent spelling errors such as separate, yield, weight and precipitate will always be checked. Each experiment must have a title and be dated. All entries must be written in ink and have the following sections: Data & Calculations, Experimental, Results & Conclusions, and References.

**Introduction (0-2 pts):** A brief statement of what the experiment is about. What will you prepare and how will you prove the identity and purity of the product. Always include the reaction, in a form similar to that below:



**Data & Calculations (0-5 pts)** - All data (melting points, boiling points, weights, *etc*) taken during the course of performing the experiment should appear in this section. Any calculations should also be included here. When reactions have been performed, theoretical and percent yields should ALWAYS be calculated. Be sure to use the appropriate units and significant figures when reporting your data. In addition, all data should be recorded directly into your laboratory notebook – not on to scratch paper and then copied into the notebook at some later date.

**Experimental Section (0-3 pts)** - In this section, summarize the procedure that was performed. However, it should be written with enough detail so that an experienced chemist could reproduce the experiment based solely on this section. Do not provide a step by step list of the procedure; it should be written in normal sentences and paragraphs. Amounts of reagents and specific descriptions of the equipment or apparatus used should be included.

**Results & Conclusions (0-6 pts)** – This is the most important section of the report. You should discuss your actual experimental results (*i.e* – melting point, boiling point, product purity, etc). Conclusions should be insightful, critical, and substantial. This is the time to show what was learned during the lab session from performing the experiment. However, you must be CONCISE!! While we do not count words, this section should be no more than 250 words. Questions such as the following should be answered: Did the results of the experiment match expectation? Why or why not? Could the procedure be improved? How? Suggest possible reasons why any problem you encountered may have occurred and how to avoid the problem in future.

For unknowns, please explain how you came to conclude the identity of your unknown. A simple statement of the unknown's identity is NOT SUFFICIENT!! If spectra have been used, they must have your name, sample source, phase and/or solvent, and the spectra must be annotated. That is, show how the spectra were used to come to your conclusion.

**Safety & Laboratory Hygiene (0-2 pts)** – Each experiment must be performed safely, and all chemicals must be handled following proper safety and hygiene protocols. This includes proper disposal of all chemical waste generated during the experiments, proper use of appropriate safety equipment (safety glasses, gloves, *etc*).

**Post-Lab Questions (0-5pts):** For most experiments, there will be a standard set of questions. These questions must be completed and turned in with your lab report unless you are informed otherwise.

**Student Learning Outcomes:** This course is a complementary laboratory course to the lecture courses CHM2210-CHM2211 (Organic Chemistry I and II, resp.). It is designed to develop more advanced laboratory skills and techniques for practical applications of the principles of Organic Chemistry. Learning to work safely is a primary concern. The lab course is graded separately from the lecture course. The student will learn to prepare informative lab reports.

**Theoretical/Mental skills:**

1. Determine molecular weight and molecular formula from a line structure.
2. Calculate theoretical and percent yield for reactions
3. Properly interconvert between mass and volume of reagents by the use of density.
4. Determine the weight and moles of solute in solutions given the concentration as molarity or weight percent

along with density.

5. Obtain basic understanding of processes occurring during lab experiments (carrying out reactions, washing, drying, extraction, heating at reflux, *etc.*).
6. Develop independent thought processes.
7. Prepare lab reports that effectively communicate the experiment that was performed.

### **Physical Skills**

1. Accurately measure melting and boiling points.
2. Properly identify and use laboratory glassware (distillation, extraction, drying, *etc.*)
3. Accurately measure reagents and products used/prepared in chemical experiments (use of balance, melting point apparatus, separatory funnel, *etc.*)
4. Safely perform the laboratory experiments (read reagent labels, follow procedures)
5. Develop good laboratory safety practices (waste disposal, wearing of gloves and eye protection, safe attire)
6. Make efficient use of time.

**GRADES:** The grades will be determined based on the criteria listed below. Overall, scores of 92-100 will earn A, 90-91 A-, 88-89 B+, 82-87 B, 80-81 B-, 78-79 C+, 72-77 C, 70-71 C-, *etc.*

**Notebooks** 50% - This will be based on the grading of your lab reports for the individual experiments performed during the semester. See details above as to what is expected for these reports. When an experiment involves the identification of two unknowns (an acid and a neutral in CHM2210, or a liquid and a solid in CHM2211), each unknown will be graded separately, and the experiment will count as two 20 point grades.

**Lab Final and Quizzes** 30% - This will include a final exam given over the experiments and techniques learned during the semester. In addition, there will be unannounced quizzes during the semester which will be included here. Final is 15% and quizzes are 15%.

**Participation** 20% - Evaluation by the instructor of your performance during the semester, which will be based on laboratory technique, safety, laboratory hygiene, attendance, promptness, being on-time for pre-lab discussion, and demonstrating the skills mentioned in the “Student Learning Outcomes” section.

**Academic Honesty:** As members of the University of West Florida, we commit ourselves to honesty. As we strive for excellence in performance, integrity—personal and institutional—is our most precious asset. Honesty in our academic work is vital, and we will not knowingly act in ways which erode that integrity. Accordingly, we pledge not to cheat, nor to tolerate cheating, nor to plagiarize the work of others. We pledge to share community resources in ways that are responsible and that comply with established policies of fairness. Cooperation and competition are means to high achievement and are encouraged. Indeed, cooperation is expected unless our directive is to individual performance. We will compete constructively and professionally for the purpose of stimulating high performance standards. Finally, we accept adherence to this set of expectations for academic conduct as a condition of membership in the UWF academic community.

**Students with Special Needs:** Students with special needs who require specific accommodations for examinations or other course activities should contact Barbara Fitzpatrick, Director of the Student Disability Resource Center (SDRC) (web address: <http://www.uwf.edu/SDRC>, e-mail: [sdrc@uwf.edu](mailto:sdrc@uwf.edu), telephone: 474-2387). SDRC will provide the student with a letter for the instructor that will specify recommended accommodations for individual students.

**Cell Phones:** Please turn your cell phones off or on silent/vibrate during lab. Distractions are dangerous and discourteous to the class.

**Final Word:** This syllabus outlines how it is planned to present this course. If circumstances warrant, changes may be made and you will be notified by a message to your official UWF e-mail address.