Course Number and Title: CHE 331L - Organic Laboratory I

Instructors
Sections: 020 & 021
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- Office Hours: 7-8am M-F; 9:30-10:30am TR; 1-3pm M; or by appointment
- Class meeting time and place: 12:30 - 4:20pm; Tuesdays; NM132 & C210 / C211

Course Overview
Catalog Description: Organic Laboratory - synthesis and characterization of organic compounds.

Pre-requisites: A grade of C in CHE 134 and 134L (or its equivalent)  Co-Requisites: CHE 331

Required Course Materials:


Laboratory Notebook: You must use a spiral-bound lab notebook.
- If you took CHE 133L/134L at SFA, you will use the same type of notebook.
- You MAY NOT use the same notebook you used for CHE 133L/134L. You MUST purchase a new notebook.
- Notebooks may be purchased from Dr. Frantzen (M119) for $20 (cash only).
- This type of notebook is the ONLY type that will be allowed for this lab. No other type of notebook will be accepted.

Calculator: A scientific calculator will be required for every laboratory. Bring one with you for every lab period

Attire:
- You MUST wear long pants and closed-toe shoes for each laboratory.
- Approved safety goggles will be provided in your lab drawer. If you wish to use other safety goggles, the professor must approve them personally before you are allowed to use them in lab.

Online Homework: MasteringChemistry  http://www.masteringchemistry.com/site?login=1

Online Homework Course ID: MCJEFFERY97077
Course Objectives:

Students will learn principles of organic chemistry in the laboratory. In the process, they will familiarize themselves with a broad range of techniques and procedures important to the successful practice of experimental organic chemistry. Special emphasis will be placed on:

- the safe handling of chemicals
- the proper manipulation of labware and instrumentation specific to the organic chemistry laboratory
- the maintenance of proper laboratory experimental records
- organic spectroscopy: the use of MS, IR, and NMR in structural elucidation
- emphasis will be placed on the use of scientific report writing as a means of communicating experimental results and as a means of demonstrating an overall understanding of the chemical principles and concepts used during laboratory activities.

Student Learning Outcomes: Upon completion of this course, the student will be able to:

- Analyze spectroscopic data (IR, MS, and \(^1\text{H-NMR}\)) in order to elucidate the correct structure of a molecule, including being able to assign correctly various spectral attributes and features to a particular portion of a molecules structure.
- Follow a published procedure to:
  - Perform an organic reaction successfully
  - Isolate and purify the product of an organic reaction (PLO 3)
- Analyze spectroscopic data (IR, MS, and \(^1\text{H-NMR}\)) in order to:
  - Elucidate the correct structure of a molecule
  - Assign correctly various spectral attributes and features to a particular portion of a molecule’s structure.
- Write a good laboratory report including:
  - Recording his/her procedure, data, and observations in the laboratory notebook
  - Demonstrating in writing that he/she understood the chemical & physical principles involved in laboratory techniques & manipulations
  - Following established principles for communicating laboratory data & results (PLO 5)

Course Requirements:

Your grade will be determined by evaluating your performance in lab activities. A list of these activities and their weight in the overall semester grade is shown below:

<table>
<thead>
<tr>
<th>Lab Activity</th>
<th>Percent of Semester Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS, IR, &amp; NMR Quizzes and online Mastering activities</td>
<td>20%</td>
</tr>
<tr>
<td>Recryst. (Brief report)</td>
<td>10%</td>
</tr>
<tr>
<td>Extraction (Full report)</td>
<td>30%</td>
</tr>
<tr>
<td>Alcohol Ox. (Brief report)</td>
<td>10%</td>
</tr>
<tr>
<td>Notebook Carbons</td>
<td>10%</td>
</tr>
<tr>
<td>Combined Spectra Quiz</td>
<td>15%</td>
</tr>
<tr>
<td>Technique</td>
<td>15%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Percent</th>
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<tbody>
<tr>
<td>A</td>
<td>90.0 – 100%</td>
</tr>
<tr>
<td>B</td>
<td>80.0 – 89.9%</td>
</tr>
<tr>
<td>C</td>
<td>70.0 – 79.9%</td>
</tr>
<tr>
<td>D</td>
<td>60.0 – 69.9%</td>
</tr>
<tr>
<td>F</td>
<td>00.0 – 59.9%</td>
</tr>
</tbody>
</table>

Method of Evaluation:

Grading scheme for each lab activity:
In each activity, you will be evaluated on the following: your preparation for the lab activity, the lab notebook you keep while performing the activity, the report you write after the lab activity has been completed, and your lab technique, i.e. how well you have mastered the technical and manipulative skills that are needed for the lab activity. You will be provided with other handouts that contain more specific information regarding lab notebooks and report writing. It is your responsibility to read these materials and comply with the guidelines outlined in these materials.
Expectations:

Organic Laboratory is an experiential course. You are expected to learn from participating in the experiment using the knowledge you have gleaned from the lecture portion of the class to improve laboratory results. You will NOT be given all of the information you will need! While the instructor will ensure your safety, the student is responsible for learning from the experimental exercise.

Spectroscopy Quizzes: 35% of Grade:

Spectroscopy is how we view molecules and is one of the most important skills in organic chemistry. We will practice these skills early so we can utilize these skills in the laboratory. You will be presented online and in-class quizzes to help you practice these skills. You should become very familiar with chapters 12 & 13 from the Wade text while also using chapters 32 & 33 from Zubrick’s “The Organic Chem Lab Survival Manual”.

Notebook & Pre-lab outline: 10% of Grade:

The student should be prepared for the experiment prior to the laboratory. This is primarily a safety concern, but prepared students often complete experiments more efficiently and obtain the necessary data required to write excellent reports. Organization is clearly important, and is the most important feature of the laboratory notebook. A well-organized organized notebook is more important than a neat notebook. Notebook mistakes can be crossed out and corrected (as long as a brief explanation for the correction is inserted and dated in the margin) for accuracy. An outline that covers the procedure to be performed should be in the notebook, but may be copied on loose-leaf paper prior to lab. The pre-lab outline should be done in a stepwise, “cookbook” fashion. Outlines may be written by hand or may be typed. You should use the outline as your primary source for guidance while performing the lab. Failure to prepare a proper outline prior to lab will result in a loss of all lab technique points for that activity. In addition, you will not be allowed to enter the lab until you have prepared a proper outline. This might result in you not having a sufficient amount of time to perform the day’s experiment, and can result in you being sent home for the day. If this should happen, you can expect to receive a substantial penalty on the lab in question.

The notebook is the most important document produced during the laboratory. It is this information that will be used for the writing of reports, and the determination of how modification of the experiment may affect change. You must NEVER erase anything from the notebook! Everything written into the notebook should be permanent, thus you should only write in blue or black ink. The first experiment will be used to demonstrate the value of a good notebook.

Reports: 50% of Grade:

The reports will be either brief or full and complete descriptions describing the experiment. Your instructor will provide the information you are expected to present in each report. It is important that you write clearly, concisely, and correctly. Each report written will be allowed one review at least 24-hours prior to its due date. The instructor will check the document until five (5) errors have been observed. This technique has been shown to improve student proofreading skills and produce better documents.

If you have a question or complaint about how a particular lab report was graded, you must notify the professor in writing no later than five (5) class days after the lab report was returned to you. Your written appeal should discuss the specific nature of the problem. Grades will NOT be changed if you do not make an appeal within the two class-day period. It is recommended that you keep ALL graded papers until the end of the semester. In the event of a question or discrepancy about a grade on a particular activity, you will be required to produce the item in question before any grade is changed.

Technique: 15% of Grade:

Technique is extremely important in organic chemistry and can determine the success of a reaction. It is extremely important that the student understand the procedure and/or mechanism of the reaction if optimization of the experiment is to be achieved. (HINT: The instructor can be beneficial!)

Note: If you drop the course, you MUST still check out of lab. If you check out at the end of the semester and do not clean your equipment satisfactorily, your course grade will be penalized by one letter grade!
Attendance Policy: You cannot do the lab if you are not present (obviously)

- There are no “make up” labs.
- You are responsible for notifying the professor NOT the TA (in writing) if you know that you will have to miss a lab.
- If you miss one laboratory for an excused reason (as defined by the SFA Policies and Procedures Manual), you can be allowed to complete a lab activity during another lab activity (only on the day that you are scheduled to be in lab). This is only allowed with the professor’s explicit permission.
- If you miss a laboratory for an unexcused reason, you will receive a grade of zero (0) on that lab.
- A total of two unexcused absences will result in a grade of zero on the missed lab AND your semester lab grade will be lowered by one letter grade.
- Three or more absences will receive an automatic F in the course.
- If there are extenuating circumstances (e.g. serious illness), you are responsible for notifying the professor as soon as possible.

Semester Withdrawals:
Please note: The last day to drop this course without receiving a WP or WF on your transcript is Wednesday, Oct. 28th. If you drop the course, you MUST check out of the lab also. If you do not check out of lab, the Registrar will not authorize the drop. Please see your professor if you wish to check out of lab.

Academic Integrity Policy:
Each student should acquaint him/herself with the University's codes, policies, and procedures involving academic misconduct, grievances, sexual and ethnic harassment, and discrimination based on disability. Copies of the SFA Policies and Procedures Manual can be obtained in print or online from the Office of Academic Affairs (http://www.sfasu.edu/upp/pap/academic_affairs.html).

Students engaging in academic misconduct (including cheating, plagiarism, or any other action that can improperly affect evaluation) will be subject to sanctions in accordance with SFA Academic Integrity Policies. We will recommend a grade of "F" for the course and expulsion from the University for any such violations.

Academic Disabilities Policy:
Stephen F. Austin State University is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with me as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Office of Disability Services is located in Human Services Bldg., Room 325, (936) 468-3004, or (936) 468-1004 (TDD).

Lab Conduct Policy:

- You are expected to follow the Chemistry Dept. safety rules AT ALL TIMES while in lab. A copy of the departmental safety agreement will be provided for you to read and sign.
- Horseplay in the lab is ABSOLUTELY FORBIDDEN. If you are caught engaging in horseplay, you will be removed from lab for the day and will receive a grade of zero (0) on that lab activity. This is the only warning you will receive about horseplay.
- Goggles must be worn AT ALL TIMES whenever ANYONE is working in the lab. If your goggles fog, step into the hallway to clean them. Failure to wear goggles in lab will result in you being removed from the lab for the day and receiving a grade of zero (0) on that lab activity. This is the only warning you will receive about wearing goggles.
- You are also expected to conduct yourself in a mature and responsible manner while in lab. NOTE: Usage of cell phones (including text messaging) while in lab is PROHIBITED. Turn your phones off before coming into lab. You will be removed from lab for the day and will receive a grade of zero (0) if you use your cell phone in lab.
- Lab begins promptly at the scheduled time. BE ON TIME! Chronic tardiness problems can result in penalties to your grade.

Failure to do any of these will result in a substantial grade penalty. Repeated or serious conduct problems will result in you being removed from lab permanently, and can result in disciplinary action from the university. We reserve the right to change any items contained in this syllabus. This includes, but is not limited to: course content, scheduled dates, grade cutoffs, and fraction(s) of final grade assigned to individual components of the course. If we need to make such changes, we will inform you of the changes in writing. This syllabus in no way constitutes a legally-binding contract on our part.
Organic Laboratory Policies:

- You are not in freshman chemistry anymore. The organic lab can be a dangerous place. Many of the chemicals you will use are toxic, corrosive, flammable, or otherwise hazardous. You do not need to be afraid of these chemicals; however, you do need to have a healthy respect for them. If you have a question about how to handle a chemical or piece of equipment properly, ask the TA or the professor.
- The best safety device you have in lab rests upon your shoulders. You have a brain. Think BEFORE you do things.
- Many accidents or mishaps in lab can primarily be attributed to two main factors:
  - **Failure to prepare thoroughly for lab** - You MUST know what chemicals you will be using and know the hazards associated with them. Pay special attention to any special warnings or directions given in the text or handouts. Listen attentively during the pre-lab lecture. Ask questions if you are unsure of how to handle a particular chemical or how to do a procedure. It is much better for you to ask and take a few minutes of class time than for you to do something incorrectly, ruin an experiment, or possibly create a safety hazard in the lab.
  - **Momentary episodes of carelessness** - Many times students simply forget that they should (or should not) do something until they do it (or don’t do it). At that point, it is too late. THINK about what you are doing. If you see a classmate doing something incorrectly, tell him/her. A lot of these problems can be alleviated or even avoided through proper, thorough preparation.
- A copy of the SFASU Department of Chemistry safety rules has been provided for you. READ THEM!!! You MUST sign this form before being allowed to participate in lab.
- You are expected to follow all safety rules AT ALL TIMES while in lab.
- **ATTENTION FEMALE STUDENTS**: IF YOU ARE PREGNANT, OR IF YOU FIND OUT YOU ARE PREGNANT WHILE TAKING THE LAB, PLEASE NOTIFY THE COURSE COORDINATOR AT ONCE!
- **APPROVED SAFETY GOGGLES MUST BE WORN IN THE LAB WHENEVER ANYONE IS CONDUCTING AN EXPERIMENT!** IF YOU ARE CAUGHT NOT WEARING GOGGLES, YOU WILL BE KICKED OUT OF LAB AND WILL RECEIVE A ZERO FOR THAT DAY’S LAB. Goggles must fit tightly around the eyes and be “splash-proof”. Goggles are provided for you in your lab drawer. If the goggles do not fit properly, or are not comfortable, please notify the TA or the professor immediately so that we can get you better goggles.
- NO FOOD, DRINK or TOBACCO USAGE is allowed in the lab! Water bottles, etc. should be kept in your backpack.
- NO EXPOSURE OF SKIN BELOW THE NECK, EXCEPT FOR THE ARMS is allowed in the lab! This means that tank-tops and sleeveless shirts are NOT allowed. No shorts or open-toe shoes (sandsals & flip-flops). YOU WILL NOT BE ALLOWED TO PARTICIPATE IN LAB IF YOU ARE WEARING OPEN-TOED SHOES. If you often wear flip-flops to class, we recommend that you store an old pair of tennis shoes in your lab drawer and change shoes before lab. In the warmer months, if you wear shorts to class, bring a pair of sweats with you and change before lab.
- Wear comfortable shoes! You will be on your feet the whole time.
- Don’t wear nice (or expensive) clothing or shoes to lab. You will get chemicals on them, even if you are careful. Oftentimes, you won’t even realize that you got something on your clothing until you wash it and see a hole in it.
- **Backpacks must be stored on the racks on the lab benches, NEVER on the floor or benchtop.**
- The only things you should have with you when doing the lab are: your lab notebook, pen, calculator, and pre-lab outline. Lab texts should NOT be out during lab.
## Tentative Lab Schedule

<table>
<thead>
<tr>
<th>Dates</th>
<th>Lab Activity</th>
<th>Graded Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/28-8/29</td>
<td>Introduction &amp; class policies / Mass Spectrometry</td>
<td></td>
</tr>
<tr>
<td>9/4-9/5</td>
<td>IR Spectroscopy &amp; Functional groups</td>
<td></td>
</tr>
<tr>
<td>9/11-9/12</td>
<td>NMR (Chemical Shift &amp; Integration)</td>
<td>Mastering Quiz #1</td>
</tr>
<tr>
<td>9/18-9/19</td>
<td>NMR (Splitting - Coupling Constants) Check-in &amp; Lab safety review</td>
<td>Mastering Quiz #2</td>
</tr>
<tr>
<td>9/25-9/26</td>
<td>Recrystallization - Part 1</td>
<td>Mastering Quiz #3</td>
</tr>
<tr>
<td>10/2-10/3</td>
<td>Recrystallization - Part 2</td>
<td>Mastering Quiz #4</td>
</tr>
<tr>
<td>10/9-10/10</td>
<td>Finish Recrystallization – Melting points Acid-base Extraction Lab: Discussion</td>
<td>Mastering Quiz #5</td>
</tr>
<tr>
<td>10/16-10/17</td>
<td>Acid-base Extraction Lab: Separations</td>
<td>Mastering Quiz #6</td>
</tr>
<tr>
<td>10/23-10/24</td>
<td>Acid-base Extraction Lab: Recrystallization</td>
<td>Mastering Quiz #7</td>
</tr>
<tr>
<td>10/30-10/31</td>
<td>Ext. Lab Mpt data / Alcohol oxidation: Reaction</td>
<td>Mastering Quiz #8</td>
</tr>
<tr>
<td>11/6-11/7</td>
<td>Alcohol oxidation: Workup</td>
<td>Draft Extraction Reviews</td>
</tr>
<tr>
<td>11/13-11/14</td>
<td>Alcohol oxidation: Data collection</td>
<td>Extraction Report Due; Brief oxidation Report Due</td>
</tr>
<tr>
<td>11/20-11/21</td>
<td>No Labs (Thanksgiving)</td>
<td></td>
</tr>
<tr>
<td>11/27-11/28</td>
<td>Combined Spectral Analysis Quiz / Check out</td>
<td></td>
</tr>
<tr>
<td>12/4-12/5</td>
<td>Dead Week</td>
<td></td>
</tr>
</tbody>
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- Your instructor will provide much more detail about what is to be included in lab reports later in the semester.
- A week prior to lab, you will be provided a handout that discusses what must be done for pre-lab preparation, the lab procedure, and how to analyze the data. You should base your preparation for lab on the content of these handouts.