Instructor
Brandon Tiegs, Ph.D.

Email
btiegs@carrollu.edu

Laboratory/Time
Jaharis 215: M 6:00 – 8:50 pm

Office Hours
W,F: 4:00 pm – 5:00 pm
Or by appointment
Location: Rankin 212

Laboratory Materials:
• Microscale Operational Organic Chemistry, Lehman (required)
• Lab notebook with duplicate pages (no spiral notebooks)

Prerequisites: CHE110 Principles of Chemistry II

Course Description: Laboratory component for CHE203.

Course Objectives: To emphasize the need for careful lab practice in handling chemicals and discuss the reactivity of certain compounds. To understand the different skills required to carefully carryout reactions at the micro- and macro-scale levels. To outline the proper role of a lab notebook for the research scientist, and teach the important aspects of a laboratory report. To see that laboratory work can be an individual as well as a group activity.

Learning Outcomes: By the end of this course, all students should be able to:

- Understand the basic principles of chemical health and safety in the lab
- Perform basic laboratory skills
- Demonstrate competency in written communication
- Understand the importance of team work in tackling scientific problems

Grading: In order to pass the entire course you must pass the lab component. A failing grade in lab will mean a failing grade for the entire course. This is a department policy. Lab is worth 20% of your overall course grade.

Attendance: You are expected to complete all labs. You must attend the pre-lab meeting. Failure to do so may result in missing the lab (along with losing the points). Two unexcused lab absences will result in a failing grade. The lab sections for this course are full so do not assume that you can make up a lab at another time.

A tentative schedule is shown below. The order in which we do the labs may change due to instrument and material availability, and the order of the lecture material. You will be given adequate time to prepare for each lab. You will be expected to have read pages 1-23 in your lab text before you begin your first experiment.

Make sure you have read through the experiment and any supplementary material before you come to each lab period. If you are not properly prepared you will be asked to leave the lab and will not be allowed a make-up. If you are ill or cannot make it to lab for a legitimate documented reason the lab will
be scored zero and this will become your lowest grade. This, however, does not mean you can choose to miss a lab. The lowest grade for the report for one lab experiment will be dropped.

**Assessment:** Your work will be assessed on the quality of your lab reports (which reflect your lab skills and overall comprehension) and record keeping skills, judged by your lab notebook.

The lab notebook will be examined at the beginning of each lab period (during the pre-lab discussion). Lab reports are due at the beginning of your lab class the week following the completion of the experiment. Reports will be written in the notebook with an additional report sheet. These can be downloaded from the course Canvas site.

For each experiment, you will be graded on the following:

- **Prelab Information:** 5 pts. (Due at the beginning of lab in your notebook)
- **Lab Report:** 20 points (Due at the beginning of lab one week following the experiment)
- **Report Sheet:** 10 points (Due at the beginning of lab one week following the experiment)

Your lab notebook should have a table of contents. All writing in the lab notebook should be done in blue or black ink. Each experiment should include procedural notes and observations as well as a results section. This should include a description of your final product (appearance, mp/bp, and analysis of relevant spectra). You should compare your result to the expected result and make suggestions for ways to improve the experiment. A sample lab report will be posted on Canvas.

Grading rubric for the lab notebook:

- **Pre-lab information:** 5 pts.
  Before coming to lab, your notebook should contain the following information:
  - Title of experiment,
  - Reference to text or handout
  - Chemical equation (if a synthesis lab) and statement of purpose,
  - Table of organic reagents and products.
    The table should be drawn with a ruler. Neatness is expected. In the table include the name, chemical formula, chemical structure, molar mass, concentration of acids and bases, density of organic liquids, mp/bp of organic reagents and products, and approximate volumes, grams and moles to be used (reagents only), and purpose of the item. Also include calculations used to determine moles or grams of reagents used in a chemical reaction.
  - Notes about safety concerns.
  - Notebooks will be checked and initialed at the beginning of lab.

Samples of Pre-Lab write-ups will be posted on the Canvas site.

- **Procedure**—5 pts.
  - Record of what you did, not a copy of the lab text (diagrams are often useful)
  - Times, temps required
Observations—5 pts
  • Record of what was observed while conducting lab: color changes, temperature changes, descriptions of reaction mixtures

Results—5 pts.
  • Description of final product—mp/bp and other physical properties (color, texture)
  • Amount of final product
  • Calculation of percent yield
  • Table of key IR bands (and analysis of other spectra collected)

Conclusion—5 pts
  • Statement of results (Go back to purpose—“Aspirin was synthesized by the reaction of acetic anhydride and salicylic acid...”)
  • State % yield
  • Summarize evidence that the product is indeed the expected product. For example, state the experimental mp/bp and compare it to reported mp/bp., and explain how spectral data confirms the identity of the product.
  • Comment on your percent yield if it was low. Provide suggestions for improving the procedure.

Lab Cleanliness: The overall cleanliness of the lab will be assessed after each lab period. If the lab has not been left in an appropriate manner, the entire lab group will be penalized 10% of their grade for that lab's report. It is important that all glassware/tubing be returned, and hoods, balances, benches, and other communal areas be left clean and ordered. Pipettes should be stored upright (or else they will be removed) and bottle caps should always be secured after dispensing.

Late Policy: Lab reports turned in after the due date will receive only half of the earned points.

Academic Integrity Policy: The Carroll University Academic Integrity Policy is located in your student handbook (https://my.carrollu.edu/ICS/Departments/Student_Affairs). I encourage you to familiarize yourself with it. If a student violates this policy in any way, I reserve the right to impose a sanction of failure on the assignment/assessment or failure in the course. If you have questions about appropriate citations, please ask.

Accommodations for Disabilities: Students with documented disabilities who may need accommodations, or any student considering obtaining documentation should make an appointment with Ms. Martha Bledsoe, Director of Services for Students with Disabilities, no later than the first week of class. She can be reached by calling 262-524-7335 or contacting her via email at mbledsoe@carrollu.edu.

Amendments to the Syllabus: The instructor and the University reserve the right to modify, amend, or change the syllabus (course requirements, grading policy, etc.) as the curriculum and/or program require(s).
# Tentative Schedule:

<table>
<thead>
<tr>
<th>Week of Classes</th>
<th>Date</th>
<th>Lab Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Sept. 11</td>
<td>Lab Overview—read pages 1-23</td>
</tr>
<tr>
<td>3</td>
<td>Sept. 18</td>
<td>Expt. 2 p. 34 Check-in/Extraction</td>
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<tr>
<td>4</td>
<td>Sept. 25</td>
<td>Expt. 3 p. 41 Recrystallization</td>
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<tr>
<td>5</td>
<td>Oct. 2</td>
<td>Expt. 4 p. 46 Synthesis of Salicylic Acid</td>
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<tr>
<td>6</td>
<td>Oct. 9</td>
<td>Exp. 15 p. 125 TLC</td>
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<tr>
<td>7</td>
<td>Oct. 16</td>
<td>No lab—Fall Break</td>
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<tr>
<td>8</td>
<td>Oct. 23</td>
<td>Expt. 23 p. 180 Br₂ Addition to trans-cinnamic acid</td>
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<td>9</td>
<td>Oct. 30</td>
<td>Expt. 24 p. 187 Hydration of Alkynes</td>
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<tr>
<td>10</td>
<td>Nov. 6</td>
<td>Exp. 5 p. 55 Simple Distillation/GC</td>
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<td>11</td>
<td>Nov. 13</td>
<td>Exp. 5 continued</td>
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<tr>
<td>12</td>
<td>Nov. 20</td>
<td>Molecular Modelling</td>
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<tr>
<td>13</td>
<td>Nov. 27</td>
<td>Expt. 10 p. 89 Steam Distillation</td>
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<td>14</td>
<td>Dec. 4</td>
<td>Expt. 29 p. 233 NaBH₄ reduction</td>
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<tr>
<td>15</td>
<td>Dec. 11</td>
<td>No lab</td>
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