UNIVERSITY OF OKLAHOMA
College of Arts and Sciences
Department of Chemistry & Biochemistry
SYLLABUS: Organic Chemistry Laboratory: Biological Emphasis, CHEM 3152, Spring 2014

I. COURSE: CHEM 3152-010 : Thursday, 5:30 – 6:20 PM : Nielsen Hall 270

Prerequisite: CHEM 3153 or concurrent enrollment (grade of C or better recommended)
Recommended concurrent enrollment in CHEM 3153

II. INSTRUCTOR INFORMATION

| Instructor: | Saravanan Ramasamy |
| Office: | PHSC 308 / SLSRC 3103 |
| E-mail: | rsaravanan1985@ou.edu |
| Desire2Learn | https://learn.ou.edu/ |
| Office Hours: | Thursday, 4:00 – 5:00 PM, and by appointment |

III. TEXTBOOK AND OTHER MATERIALS:

(Either the PDF version or the interactive iBook is required. Both are available free of charge)

Notebook: Hayden-McNeil Student Laboratory Research Notebooks (Required)
NOTE: The 100 page Student Lab Notebook is recommended. The Lab Notebook must have numbered pages and carbon/carbonless copy pages.

Other Materials: Safety Goggles (Required)
Nitrile Gloves (at least 1 pair per lab) (Required)
A black marker (Sharpie) (Required)
Laboratory Coat (Optional)

Any current Organic Chemistry Text Book (Recommended)

IV. COURSE DESCRIPTION:

Intended for life science majors. Laboratory course designed to accompany CHEM 3053 and 3153. Selected experiments designed to illustrate the fundamental techniques used in organic chemistry, to develop familiarity with the properties of organic compounds, and to introduce analytical techniques including spectroscopy.

V. OBJECTIVES:

By the end of this course, the student should be able to

- Manipulate synthetic apparatuses and glassware.
- Carry out mathematical procedures necessary in organic synthesis and analysis.
- Interpret analytical data (MP, BP, GC, IR, NMR) to verify the product/composition of a reaction.
- Explain the procedures and concepts of basic organic laboratory, separatory, and synthetic techniques.

VI. EVALUATION:

The course grade will be determined by the average of Lab Notebook, Lab Quizzes, Mid-term Exam, and Final Exam. The final letter grading for the lecture course will be as follows: A ≥ 90%, B = 89-80%, C = 79-70%, D = 69-60%, F = <60%.

<table>
<thead>
<tr>
<th>COURSE GRADE</th>
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<tbody>
<tr>
<td>Lab Notebook</td>
<td>Best 11 out of 12</td>
<td>220</td>
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<tr>
<td>Quizzes</td>
<td>4 quizzes</td>
<td>60</td>
</tr>
<tr>
<td>Pre-Lab Problem Sets</td>
<td>Best 9 out of 10</td>
<td>45</td>
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<tr>
<td>Mid-term Exam</td>
<td></td>
<td>100</td>
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<tr>
<td>Final Exam</td>
<td></td>
<td>125</td>
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<tr>
<td>Total Points Possible</td>
<td></td>
<td>550</td>
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Exams:

The Exams will cover material from the lecture, the background in the laboratory manual, and the laboratory experiments. Therefore, it will test the students’ understanding of both the theoretical knowledge of the conceptual material and the practical knowledge of the actual techniques and operations of the laboratory techniques. The exams will be prepared by the lecture Instructor and supervising Faculty and will be uniformly graded under their supervision.

Once the exams are graded and returned to the students, students should review their exams in the presence of their TA and bring any possible errors to their attention immediately. The TA will then take the exam to the lecture Instructor or supervising Faculty for verification of the grade on the exam and any disputed questions. The lecture Instructor or supervising Faculty will re-grade the exam using the original exam key. It is possible that a student’s grade may either decrease or increase from the original grade based on the Instructor’s re-grade. Once the student takes possession of their exam and left the supervision of their TA, only errors in calculating the total points on an exam will be corrected. Calculation errors should be brought to the lecture Instructor or supervising Faculty’s attention with in a week of the exam.

Lab Notebook, Quizzes, and Pre-Lab Problem Sets:

See the Laboratory Notebook Guidelines for a description of lab notebook grading procedures. The lab grade will be based on a percentage of actual points possible. Each experiment is worth a set number of 20 points as listed in the Grade Distribution Rubric. The pre-lab for each experiment may take a couple of hours to prepare properly and it is important that the student understand the intent and purpose of the experiment before attending the lab.

On most labs, it should be possible to complete the lab notebook and turn in the copy pages by the end of the lab. If the experiment requires spectral analysis that may not be complete by the end of the lab, the spectra most often will be provided to the student at the next lab. In this case, the student should complete the lab and submit the copy pages to the TA during this lab. The TA
will determine when the lab notebook pages are due based on the need for spectral analysis for the experiment. The **latest possible due date is one week** after the completion of the experiment. **No late lab notebook pages** will be accepted. Typed or “Original” Notebook pages will also not be accepted. The individual laboratory TAs will grade lab notebook assignments.

Quizzes may test material from previous laboratory experiments, from the background and pre-lab for the current/next experiment, and from the lecture. Most quizzes will consist of theoretical, practical, and calculation questions. The quizzes will be given during the lecture on the days listed on the schedule.

**Grade Adjustments:**

Large differences in grading from one TA to another are, in fact, rare. However, the supervising Faculty will review the grades for the individual laboratory sections and reserve the right to make appropriate grade modifications to address any significant variations which may occur in the grading practices from one lab section to another.

The lab grades may be normalized based on comparing the section’s average on lab notebook, lab quizzes, mid-term exam, and final exam. More emphasis will be placed on the mid-term/final exam averages since these exams will be uniformly graded across all sections of the lab. The purpose of normalization of the lab grade is to compensate for slight grading differences among the laboratory sections. The supervising Faculty members will decide if normalization is necessary and the value of the normalization of the lab grades.

**NOTE:**

Success requires not only completion of the laboratory procedures and lab notebook, but also a demonstration that the theoretical material is well understood as evidenced by exam results. Students will often have an “A” average on their lab reports, but an insufficient demonstration of an understanding of the material on the exams, which often lowers the overall grade. All aspects of the course must be completed at a high level to earn an “A” in the course.

**VII. EXAM SCHEDULE:**

- **Mid-Term Exam: Thursday, March 13th, 5:30 – 6:20** in Nielson Hall 270
- **Final Exam: Thursday, May 1st, 5:30 – 6:20** in Nielson Hall 270

**VIII. GENERAL POLICIES:**

**Questions:**

For most questions about the laboratory, see your laboratory TA. They can handle the majority of your questions directly. For questions about the laboratory grades, the exams, or the administrative aspects of the laboratory, please contact Mr. Ramasamy. For questions about the lecture material or concerning the D2L site and materials, please contact Mr. Ramasamy.

**Make-up Policy:**

*Labs: No make-up labs will be offered.* Due to space and safety concerns, it is not feasible to schedule make-up labs. Therefore, no make-up labs will be offered. The possible need for an excused missed lab is built into the grading scheme by dropping the lowest lab notebook and prelab problem set. If only one lab day is missed, then the assignments missed would be dropped. The dropping of a lab notebook and prelab problem set is not intended as a grade improvement mechanism or to allow students to miss a lab for a non-excused reason.
If a student misses two lab experiments for a University-sponsored or legally required activity, both days that the student was absent must for an excused reason. The student that misses two lab days due to an acceptable reason will have their grade scale adjusted by removing that day’s lab experiment from the total points. The missed lab will not have an impact on the student’s grade, but this will increase the impact of the remaining grades on the final average and grade. If a student has missed two lab days but only one of the days was acceptable reason, then the assignments for the excused day will be dropped and the other day’s assignments will receive a grade of zero, 0. If a student misses more than two lab experiments, it is recommended that the student contact the lecture Instructor and/or supervising Faculty to discuss the situation. A student cannot receive a grade for a lab experiment that they did not attend and complete.

Examples of the Provost-approved university-sponsored activities are scholarly competitions, fine arts performances, and academic field trips. It is also the policy of the University to excuse absences of students that observe religious holidays. Examples of legally required activities are emergency military service and jury duty. The instructor also reserves the right to excuse an absence to a lab or exam in cases of immediate medical emergencies and family deaths.

**Exams:** A make-up Exam may be offered. If a student misses an exam for a University-sponsored or legally required activity, the student should contact the instructor before the exam. An equivalent exam will be prepared and a time to take the exam will be scheduled before the end of the week. The instructor also reserves the right to excuse an absence to a lab or exam in cases of immediate medical emergencies and family deaths. Make-up exams will not be offered unless the instructor is contacted by e-mail before the exam time.

**Laboratory Dress and Conduct:**

Proper attire in the lab is important for your safety. Therefore, a student will be asked to leave the lab if they are not dress appropriately for the lab. In general, all of the student’s skin should be covered except for the lower arms and hands (up to mid-bicep) and the neck and head. A good description of what would be acceptable dress would be tennis shoes, full-length jeans, and a short sleeve T-shirt. Shoes should contain and cover the full foot. Pants/Skirts/Dress should cover all the legs to the ankle and up to the shirt/top. Shirts/Tops should cover from the pants/skirt to the neck and mid-bicep.

**Laboratory goggles should be worn at all times in the lab.** There are several experiments where gloves are required. Students should wear gloves during all experiments although the Department may not supply gloves for experiments in which they are not deemed essential.

The students should be focused on the experiment being performed during the lab. Therefore, the use of a cell phones, audio devices, or video devices are prohibited during the lab. The students should also not be reading course material unrelated to the laboratory or completing assignments from other courses. The TA has the right to ask the student to put away any material not related to the lab or to leave the lab room (this impact the student’s grade).

**Academic Integrity and Honesty:**

All students are expected to conform to college-level standards of ethics, academic integrity, and academic honesty. By enrolling in this course, you agree to be bound by the Academic Misconduct Code published in The University of Oklahoma Student Code (www.ou.edu/studentcode/OUStudentCode.pdf). For further clarification please see: www.ou.edu/provost/integrity-rights/.
All members of the community recognize the necessity of being honest with themselves and with others. Cheating in class, plagiarizing, lying and employing other modes of deceit diminish the integrity of the educational experience. None of these should be used as a strategy to obtain a false sense of success. The need for honest relations among all members of the community is essential.

Any instance of a student receiving any type of help on an exam or quiz from another person or any source (notes, online, etc.) not authorized by the instructor shall be considered academic misconduct and, as a result, will be penalized to the fullest extent possible.

Electronic Communications/Storage/Recording Devices:

All students should have cell phones off or silenced. If you are anticipating an emergency, you may have your cell phone on and set to vibrate. In such a case, you should let the instructor know in advance and situate yourself near a door so you can take the call outside the room with a minimum of disruption to class. Sending and/or receiving text or other electronic media is considered inappropriate, including if you use an electronic device to take notes that can send/receive messages of any kind. If inappropriate messaging is observed you may receive a grade penalty or be asked to leave (see Academic Integrity and Honesty). Electronic recording of lectures (pictures, video, audio, etc.) is prohibited unless written permission is given by the instructor in advance.

Accommodations:

Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities. Students requiring academic accommodation should contact the Disability Resource Center for assistance at (405) 325-3852 or TDD: (405) 325-4173. For more information please see the Disability Resource Center website http://www.ou.edu/drc/home.html.

Modification of the Syllabus

Though the main points of this syllabus are unlikely to change, the instructor reserves the right to modify any part of this syllabus.
Standard Operational Procedures in the Organic Chemistry Laboratory

Any student working in an unsafe manner may be dismissed from the laboratory by an instructor.

1. Laboratory Notebook
   a. For each experiment students must keep a written record of their work. In many scientific professions, laboratory notebooks are legal documents containing background information, repeatable directions, observations, data, calculations, results, conclusions, and spectral analysis in a permanent format.

2. Preparation
   a. Pre-Lab
      i. Students will have the prelab and procedure written and completed before coming to class.
         1. It is the student’s responsibility to obtain their TA’s signature at the beginning and end of the class.
      ii. Pre-lab problem sets must be turned in at the beginning of class before starting the experiment for the day.
   b. Procedure
      i. Students will have a thorough, concise, and bulleted procedure ready before coming to class.
      ii. Laboratory manuals are not allowed to be used during the experiment. The student’s procedure should be detailed enough to allow anyone to follow the instructions and complete the experiment.

3. Attendance & Participation
   a. Laboratory experiments are held each week unless otherwise instructed. Mandatory attendance is required to get a grade for the experiment. Preparation, efficient and appropriate use of time, attention to detail, staying on task, and a willingness to learn and participate are valuable qualities that will lead to a successful lab experience.
   b. No make-up labs are given for CHEM 3152.
   c. Students will work in groups of two unless otherwise instructed. Both students should participate equally in the lab.
   d. Students will turn in individual lab reports that are reasonably different from their partner’s work.
   e. Students should attempt to check their e-mail at least once a day to look for additional important information

4. Working Environment
   a. No food, drink, or chewing gum is allowed while in the lab.
   b. Students should disassemble and return common equipment to the TA, drawer, or cabinet at the end of the lab period.
   c. Students should complete all lab work and clean up by at least ten minutes before the end of lab. Students should be out of the lab on time to allow for the next class to be prepared.
   d. It is a good idea that students wash their hands before leaving the lab. Even if gloves were used, residual chemicals may still be present on the skin.
e. Students should wash glassware, clean the workspace area, and put the stool on
the counter at the end of the lab period unless otherwise instructed.
f. Students should take care to not contaminate chemicals, standards, solutions, or
solvents by using the same pipette or spatula in different containers without
cleaning and drying the item thoroughly first.
g. Students should not sit or lean on the counters as there may be chemical residue
remaining which may damage the skin or clothing.
h. Students should not leave the lab while wearing gloves or lab coats.

5. Glassware
   a. Students should keep their glassware reasonably clean throughout the experiment.
   b. Glassware should be cleaned at the end of each laboratory experiment.
   c. Never use a thermometer as a stirrer! Always support a thermometer in a beaker
      or flask with a clamp. If a mercury thermometer breaks, immediately contact the
      laboratory instructor and restrict access to the area of contamination until cleanup
      can be arranged.
   d. Students should immediately report all breakage of glassware to their instructor
      for disposal instructions. All glass breakages must be immediately recorded on the
      student’s breakage card.

6. Safety
   a. Safety policies and procedures are given in both the syllabus and the laboratory
      manual. All safety policies must be followed by all people entering the Organic
      laboratories.
   b. Students must wear appropriate attire while in the laboratory. This includes:
      i. Long pants
      ii. T-shirt or long sleeve
         1. No tank tops, midriffs, etc.
      iii. Closed toe, closed heel shoes.
      iv. Goggles (on the face and over the eyes)
      v. Nitrile gloves
   c. If you wear contact lenses, try to avoid wearing them in the lab. If you must wear
      contact lenses, your goggles must seal particularly well to your face.
   d. Students should be familiar with the locations of the exits, eyewash stations,
      safety shower, and first aid kit.
   e. Fire extinguishers are restricted to the use of persons who are properly trained.
      Small fires may be extinguished by covering with a beaker or larger container.

7. Heating Equipment
   a. No open flames are allowed in the organic lab!
   b. Reactions that are exothermic and/or being heated must be monitored. Do not
      leave them without having your partner present to keep an eye on the reaction.
   c. Turn off electrical equipment immediately after you have finished unless your
      instructor has stated otherwise.
   d. Never heat a closed system. Pressure will build up and cause the glass to fail. This
      could result in glass projectiles being sent in all directions.
8. Waste Disposal
   a. Students should record waste properly by spelling out all the components on both the liquid and solid waste sheets. No abbreviations, formulas, or symbols are allowed.
   b. Do not dispose of waste by pouring it down the drain or throwing it away in the trash. Dispose of waste in the proper location. If the student is uncertain, the laboratory instructor can provide the correct information.

9. Electronic Usage
   a. All students should have cell phones off or silenced. If you are anticipating an emergency, you may have your cell phone on and set to vibrate. In such a case, you should let the instructor know in advance and take the call outside the room with a minimum of disruption to class. Sending and/or receiving text or other electronic media is considered inappropriate, including if you use an electronic device to take notes that can send/receive messages of any kind. If inappropriate messaging is observed you may receive a grade penalty or be asked to leave. Use of iPods, iPads, music players, computers, or other electronic devices are prohibited while in the lab unless written permission is given by the instructor in advance.

10. Consequences of Violations
    a. First violation will result in the loss of technique points for the current experiment.
    b. Second violation will result in the grade of zero for the current lab.
    c. Third violation will be grounds for removal from the course.
    d. If there are multiple violations in a section on any one day the result will be a zero for the entire class for the current lab.
## CHEM 3152 Lab and Lecture Schedule
### Spring 2014

<table>
<thead>
<tr>
<th>Week</th>
<th>Lab (Mon, Tue, Wed, Thu)</th>
<th>Lecture (Thursday 5:30 pm)</th>
</tr>
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<tbody>
<tr>
<td>Jan 13 – Jan 17</td>
<td>Chapter 1: Check In / Eppendorf Pipette / MP</td>
<td>Introduction, Solubility, &amp; Extraction</td>
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<tr>
<td>Jan 20 – Jan 24</td>
<td>NO LAB</td>
<td>General Lab Techniques</td>
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<tr>
<td>Jan 27 – Jan 31</td>
<td>Chapter 2: Nutmeg Extraction (Chapter 4: fermentation set up only)</td>
<td>Fermentation / Distillation</td>
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<tr>
<td>Feb 3 – Feb 7</td>
<td>Chapter 4: Fermentation / Distillation</td>
<td>Partition Coefficient Quiz 1</td>
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<tr>
<td>Feb 10 – Feb 14</td>
<td>Chapter 5: Partition Coefficient</td>
<td>Anthraquinone Dyes - Chromatography</td>
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<tr>
<td>Feb 17 – Feb 21</td>
<td>Chapter 7: Anthraquinone Dyes</td>
<td>Qualitative Analysis Quiz 2</td>
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<tr>
<td>Feb 24 – Feb 28</td>
<td>Chapter 8: Qualitative Analysis</td>
<td>Spectroscopy: IR &amp; MS</td>
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<tr>
<td>Mar 3 – Mar 7</td>
<td>Chapter 9.1: Spectroscopy IR/MS</td>
<td>Spectroscopy: NMR</td>
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<tr>
<td>Mar 10 – Mar 14</td>
<td>Chapter 9.2: Spectroscopy NMR</td>
<td>Midterm Exam (Mar 13, during lecture)</td>
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<tr>
<td>Mar 17 – Mar 21</td>
<td>NO LAB</td>
<td>NO LECTURE</td>
</tr>
<tr>
<td>Mar 24 – Mar 28</td>
<td>Chapter 10: Diels-Alder</td>
<td>Diels-Alder, Williamson Ether Synthesis</td>
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<tr>
<td>Mar 31 – Apr 4</td>
<td>Chapter 13: Williamson Ether Synthesis</td>
<td>Borohydride Reduction Quiz 3</td>
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<tr>
<td>Apr 7 – Apr 11</td>
<td>Chapter 14: Borohydride Reduction</td>
<td>Multistep Synthesis Types</td>
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<tr>
<td>Apr 14 – Apr 18</td>
<td>Chapter 17: Multistep Synthesis</td>
<td>Benzocaine Synthesis</td>
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<tr>
<td>Apr 21 – Apr 25</td>
<td>Chapter 19: Benzocaine Synthesis</td>
<td>Final Exam Review Quiz 4</td>
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<tr>
<td>Apr 28 – May 2</td>
<td>Check Out</td>
<td>Final Exam (May 1, during lecture)</td>
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