

# DEPARTMENT OF CHEMISTRY

## ORGANIC CHEMISTRY LAB I CHEM 2100 - Spring 2020 (CRN 16141)

**Pre-Lab Lecture (mandatory):** Tuesday 3:00 to 3:50 pm, PSC 362

**Lab: (mandatory):** Tuesday 4:00 to 7:45 pm, PSC 357 and 339

**NOTE:** You must attend lab lecture and understand the concepts before entering into the laboratory to perform any experiment.

### TEXTBOOKS and LABORATORY MATERIALS

- Chem. 2100 Lab Manual (will be distributed during the first lab)
- Experimental Organic Chemistry by Wilcox and Wilcox, second edition, 1995
- Introduction to Spectroscopy by Pavia, Lampman and Kriz 4th edition (Optional)
- The Organic Chem Laboratory Survival Manual, Zubrick 8th edition (Optional)
- Stitched notebook (mandatory and required first day of lab)
- Safety glasses/goggles (mandatory and required first day of lab)

Also **NOTE:** Absolutely No shorts, No sleeveless, No open toe/open top shoes, No untied long hair, No caps, No Crocs, will be allowed in the lab. Safety will be enforced in the lab.

**Instructor:** Dr. Thomas J. Robilotto

**Office Location:** 302 Petit Science Center

**Email:** trobilotto@gsu.edu

**Office Hours:** Tuesday and Thursday 1:00 – 3:00 pm  
Or by appointment. For email communication, use your GSU email and write the course #, lab day, and the subject (for example, Chem 2100 W-appointment)

### Course Objective

The course has been divided into **two** parts. In the first part, students will isolate and purify compounds from natural products, such as *tea leaves and nutmeg* to learn different extraction techniques such as *liquid-liquid* extraction and *solid-liquid* extraction. Students will also have the opportunity to synthesize a compound. The compounds isolated will be purified by recrystallization, sublimation or distillation and characterized using spectroscopic techniques.

In the second part, students will purify three unknown liquids (NEAT and BINARY mixture) by distillation. The BINARY distilled products will be analyzed using Gas-Liquid Chromatography (GC) to determine the purity. Spectroscopic techniques such as infrared spectroscopy (IR), and mass spectrometry (MS) will be implemented to assist in the identification of the unknown structures. Students will learn the fundamental principles behind each technique and master how to interpret spectra in the assignment of their unknown organic structures. Also, students will learn how to write a scientific laboratory report which would be graded.

### Teaching Schedule

The lab/lecture schedule listed on **page 7** of the GSU laboratory manual will be adhered to as far as possible. To supplement this lab/lecture schedule, a detail schedule will be posted on iCollege. You would be informed of any changes made to the schedule. Note that these schedules are all tentative.

### Students' preparedness

- For each lab day, we will have a discussion on the procedure (method) for the lab expected to perform on the lab day, so ensure to read the lab from the text and any handouts given prior to coming to the lab.
- You are responsible for the material discussed in lectures and assignments from the textbooks to apply in all quizzes and final exam.
- Do not miss lectures otherwise you will not know what is going on.
- You are to adhere to the lab safety rules presented and follow instructions carefully.
- Absolutely no use of cell phones during lectures and labs.

### Lab policy

- Students who need to make-up a lab should obtain an authorization signed by the lab instructor before attending a different lab session.
- Cleaning up is part of the lab session. Students should stop working and begin cleaning up their work area, including their hood space, at least 25 minutes before the conclusion of the lab session.

### Quizzes and homework

- Quizzes to be taken will be announced one week in advance.
- Home work will be announced in advance, and must be submitted on the designated day. Failure to submit would result in deduction of points. Please check iCollege for information pertaining to this course.

### GRADING SCHEME

Final Exam:	100 points
Final Report	100 points
Experiments 1-4 worksheets	50 points
Quizzes, homework, notebook, attendance, and preparation	<u>150 points</u>
	Total 400 points

- Lab notebooks must be submitted to receive a passing grade.
- Lab notebooks must be picked up within three weeks after final grade deadline (after which time they will be discarded)

Letter grades are assigned based on the following scale (which may be varied slightly):

Points	Percentage	Letter grade
≥380	≥ 95%	A+
≥ 360 to < 380	≥ 90% to < 95%	A
≥ 348 to < 360	≥ 87% to < 90%	A-
≥ 336 to < 348	≥ 84% to < 87%	B+
≥ 320 to < 336	≥ 80% to < 84%	B
≥ 312 to < 320	≥ 78% to < 80%	B-
≥ 300 to < 312	≥ 75% to < 78%	C+
≥ 276 to < 300	≥ 69% to < 75%	C
≥ 260 to < 276	≥ 65% to < 69%	C-
≥ 240 to < 260	≥ 60% to < 65%	D

The grade letter you earn will be assigned. You will have access to most of your grades in iCollege.

### **Important Dates**

Jan	14 <sup>th</sup>	Labs begin: check in, safety quiz
Jan	20 <sup>th</sup>	Holiday (MLK)
Mar	3 <sup>rd</sup>	Midpoint: last day to withdraw with a grade of "W"
Mar	16-22 <sup>nd</sup>	Holiday: Spring Break (no lab)
Apr	21 <sup>st</sup>	Final exam (3:00 - 5:00 pm) followed by check out
Apr	24 <sup>th</sup>	Final report and Notebook due in my Office 302 Petit Science Center by 12:00 pm

The University requires that faculty members must, on a date after the mid-point of the course to be set by the Provost (or his designee)

1. Give a **WF** to all students who are on their rolls but are no longer taking the class and
2. report the last day the student attended or turned in an assignment.

Students who are withdrawn may petition the Departmental Chair for reinstatement into their classes.

### **NOTE:**

**Students are requested NOT to bring cellular telephones and/or pagers to lectures and labs, or exams. Persons violating this request will be asked to leave the room.**

### **Miscellaneous:**

1. Department of Chemistry Statement on Student Integrity applies to this course (see below).
2. Attendance to **lecture** and **lab** will be recorded. Absences can result in loss of points and lower grades (Sign-in/out of lab required).
3. Lab books must be recorded **in ink** at the time the measurements are made. **They will be graded during the lab section without announcing! Lab notebooks must be bound.**
4. **Safety glasses\* are required and must be worn at all times.** \*The student must bring a pair of safety glasses/goggles to the first lab. These may be purchased at the GSU Bookstore, the Georgia Bookstore, and most hardware stores. Students who are unable or forget to bring their glasses may buy a pair from their lab Coordinator by filling out a breakage form in the lab. Students who obtain glasses in this manner will pay for them at the time they check out of the lab. Students will not be allowed into the lab without their glasses/goggles or properly attired.
5. **Gloves MUST be worn when handling chemicals.**
6. **SAFETY. Failure to follow safety procedures will result in EXPULSION from that lab session with no make-up allowed and loss of credit. SAFETY, NOTHING GOES INTO THE SINK, USE THE HOODS!!!** Please bring me a schedule of your RELIGIOUS HOLIDAYS OBSERVANCE the SECOND WEEK of class. If you fail to do so you might miss important quizzes for this course. Please check iCollege regularly for announcements to include homework and quizzes.

### **DEPARTMENT OF CHEMISTRY POLICY STATEMENT REGARDING STUDENT INTEGRITY:**

The Department of Chemistry follows the university policy on academic honesty published in the "Faculty Affairs handbook" and the "On Campus: The Undergraduate Co-Curricular Affairs handbook." Any suspected offenses may be referred to the Department Chair for appropriate action. All tests taken must represent your individual, unaided efforts. To receive or offer information during an examination is cheating. The use of unauthorized supplementary materials during tests is also cheating. All laboratory work performed during this course must reflect your individual effort. Only original data obtained by your own laboratory experimentation are to be used, except when specifically authorized by your laboratory professor. Data from supplementary sources (handbooks, reference literature, etc.) must be clearly referenced (title, author, volume, page(s), etc.). Falsification or destruction of data constitutes cheating.

**Very important: The following is a tentative schedule** of procedures and activities for **Chem 2100 Spring of 2020**. Any changes and deviations from this syllabus will be announced during class (quizzes, homework, and others). Do not miss lectures otherwise you will not know what is going on.

**Deviations from this syllabus may be required!**

Date	Week	TENTATIVE SCHEDULE OF LECTURES AND ACTIVITIES	Miscellaneous, reading, assignments	Lab Text Pages
Jan. 14th	1	Safety, Lab Check-in, Students receive unknowns, Project Overview.	Introduction, Lecture, Write unknown numbers in the notebook and roll	Safety Quiz 103-117, 84, 89
Jan. 21st	2	<b>Extraction of trimyristin from nutmeg</b>	Lecture	<b>HW1 issued</b>
Jan. 28th	3	<b>Natural Product Extraction</b>	Lecture	<b>HW1 due</b>
Feb. 4th	4	<b>Separation of Benzoic Acid and Acetanilide</b>	Lecture: Discussion Simple Distillation	<b>Quiz 1, HW2 issued</b> 378-379
Feb. 11th	5	<b>Esterification of Acetic acid</b> Boiling point & Distillation	Discussion	<b>HW2 due</b> 4-68
Feb. 18th	6	<b>Simple distillation:</b> Purification of neat liquid	IR	<b>Quiz 2, HW3 issued</b> 4-68
Feb. 25th	7	<b>Fractional distillation</b> of unknown mixture.	IR	<b>HW3 due, Notebook Check</b> 4-68
Mar. 3rd	8	<b>CONTINUE:</b> Separation of Low boiler (LB) and high boiler (HB), Boiling Point, <b>Gas Chromatography (GC)</b>	<b>GC ON</b>	<b>Quiz 3</b> <b>HW4 issued</b> 4-68
<b>Mar. 3rd</b>		<b>Last day to withdraw and receive a W</b>		
Mar. 10th	9	Fractional distillation: (IR) <b>Spectroscopy, Chemical Tests</b> Continue separation of high boiler and low boiler <i>IMPORTANT: save LB and HB for chemical tests on week 10</i>	<b>GC ON</b>	<b>HW4 due</b> 4-68; 529
Mar. 16-22		<b>SPRING BREAK</b>	NO LAB	NO LAB
Mar. 24th	10	<b>Boiling point checkup for LB.</b> Continue separation of LB, HB, Chemical Characterization Tests	<b>GC ON</b>	<b>Quiz 4</b> <b>HW5 issued</b> 529
Mar. 31th	11	Chemical Characterization Tests Introduction Mass Spectrometry	<b>GC ON</b>	<b>HW5 due</b>
Apr. 7th	12	Mass Spectrometry, <b>slides, request an mass spectrum of the unknown you have more difficulty to identify</b>	<b>Last week to use GC</b>	<b>208-231</b>
Apr. 14th	13	Miscellaneous Topics, how to study for the FINAL EXAM. Form of Final Report / Lab work completion, <b>only bp, chemical tests, IR, RI, density, and books search are allowed, no more distillations</b>	<b>GC OFF</b> Last week to request MS of <b>ONLY ONE</b> of the unknowns	<b>CHECK OUT</b> <b>Quiz 5</b>
Apr. 21rd	14	<b>FINAL EXAM (3:00-5:00pm)</b>		
Apr. 24th		<b>FINAL REPORT DUE 12:00 pm at PSC 302</b>	<b>Report is not accepted without notebook</b>	<b>Final report and notebook are due by noon</b>