

CHEMISTRY 237 COURSE SYLLABUS

“Organic chemistry Laboratory I” Fall 2003

Course

Description: Chemistry 237 will introduce techniques to further students' appreciation and understanding of modern organic chemistry. Emphasis will be in performance and understanding of experimental techniques, purification and isolation of compound synthesized.

Instructor: Dr. Emad Aqad
Office hours: Monday and Thursday 10:30-11:30 AM or by appointment
Room: 354 (Lloyd)
Phone: 348-9490.
e-mail: emad@bama.ua.edu

Lecture: Mondays and Wednesdays 12:00-12:50 PM, room 230, Lloyd

Lab Sections:

Section 01: Monday, 13:00-17:50, Room 310 Lloyd
Section 02: Wednesday 13:00-17:50, Room 310 Lloyd
Section 03: Thursday, 13:00-17:50, Room 310 Lloyd

Examinations: Safety Quiz: Monday, July September 8th, 12:00 PM
Examination: Monday, December 1st, 12:00 PM

Text: “*Experimental Organic Chemistry: A balanced approach, Macroscale and Microscale*” 7th Edition
Mohrig, J. R.; Morrill, T. C; Hammond, C. M.; & Neckers, D. C.
W.H. Freeman and Company

Organic Chemistry Laboratory Notebook (50 pp), Chemical Education Resources. Palmyra, PA (or other notebook that makes removable copies of permanently attached pages).

Supplementary

Material: *Working Safely with Chemicals in the Laboratory*, Genium, Schenectady, NY, 1993. (On reserve in Rogers Science and Engineering Library.)

Grading:

SCORING POLICY:

The grade for this course will be broken into the following categories:

1) PRE-LAB QUIZ (30%)

There will be a quiz at the end of each class period. Questions will cover safety concerns, names and structures of chemicals used, reaction/s to be carried out on the same week, reactions mechanisms, techniques used in the experiment, and other information in the chapter assigned. Your lowest quiz grade will be dropped, and the remaining grades (including the safety quiz) contribute 30% of the final grade.

2) LABORATORY REPORTS: (50%)

Laboratory report guidelines will follow the format discussed bellow. The grade will be based in part on obtained results and how well the directions and formats given were followed. Report due dates will be announced by the instructor. There is a 5 point per day penalty for late reports and no report will be accepted for grading more than one week late.

3) FINAL EXAMINATION: (20%)

A comprehensive final exam is given at the end of the semester.

GRADE FOR COURSE: The final grade for the course will be computed from the above categories (percentage of total grade for each category indicated in parentheses.) and letter grades assigned using the following scale as a guide:

<u>Score</u>	<u>Grade</u>
100 - 90	A+, A, A-
89 - 80	B+, B, B-
79 - 70	C+, C, C-
69 - 60	D+, D, D-
59 - 0	F

At the end of the semester, final grades *may* be adjusted upwards at the discretion of the instructor. All questions regarding grading of individual lab reports should **first** be directed to the appropriate teaching assistant.

Teaching

Assistants: The laboratory teaching assistants have full responsibility and authority in the laboratory. Please respect their authority by being responsible individuals when a request is made.

Attendance: **Attendance in labs and lectures is required.** Because of the scheduling of resources will most likely preclude any possibility of a “make-up” lab, only cases of missed laboratory time caused by serious illness or death of close relative can be considered for possible rescheduling or alternative remedy. These instances must be approved by the instructor. There will be no make-ups allowed for the Safety quiz or examination.

Notebook: The purpose of a laboratory notebook is to record all pertinent information about a laboratory procedure is being done; this promotes the accurate communication of the procedure to the scientific community and or any other interested party. You should record any observations and data directly in your notebook. Do not record in a temporary manner to be transferred at some later time into your notebook. A teaching assistant must sign your notebook before you leave the laboratory and they must note any data correction with their initials next to you.

Prelab: An outline of the experiment to be performed in the lab must be written in your notebook before coming to lab. The outline should include:

1. title of the experiment
2. a reference for the experiment (to the textbook)
3. balance equations for reactions that are being performed (if applicable)
4. A table of reagents
5. The procedure to be followed in the experiment written on the left hand side of the page in outline form

These outlines must be checked and signed by teaching assistant before beginning work in the laboratory.

Participation/

Attitude: You are expected to come to the lab prepared to perform your experiment. Furthermore, you are required to work in a safe manner and to clean up after yourself. Therefore, 10% of your lab report grade will be based upon participation/attitude grade assigned each lab period by your TA. Failure to meet these expectations will result in loss of points or removal from the lab.

Laboratory

Reports: Lab reports are due one week following the completion of the experiment. Reports should be turned in to the appropriate TA at the beginning of the laboratory period. Late reports will be penalized 5% per weekday.

Your reports should include:

1. carbon copied of your notebook pages containing your prelab assignment, observation and data
2. yield calculations
3. interpretations of spectral data and other measurements of product identity and purity.
4. brief discussion of results (where appropriate)

Safety: ALL safety rules must be followed at all times. Failure to comply can result in immediate expulsion from the laboratory. **All** accidents and injuries, regardless of how small, must be immediately reported to a teaching assistant.

Stockroom

Policy: No transactions can be carried out at the stockroom unless you present a valid student activity card. The stockroom does not accept cash.

Academic

Misconduct: All acts of dishonesty in any work (i.e. plagiarism of lab reports, use of outside aids on exams, etc.) constitute academic misconduct. The Academic Conduct Disciplinary Policy will be followed in the event of suspected academic misconduct.

Disability

Accommodation: If you require disability accommodations, please contact Disability Services in the Center for Teaching and Learning (348-4285). Once initial arrangements have been made with that office, contact the instructor.

Clean up/Technique: Students are expected to clean their lab bench, sink, and balance areas before leaving the laboratory. Failure to do so will result in point deductions from the experimental report.

Instructor's Comments:

Despite its daunting reputation, organic chemistry laboratory can be interesting, challenging, and occasionally, fun. To get the most out of this course it is recommended that you: 1) Prepare in advance - You will not learn much by blindly following the experimental procedure without first understanding it; 2) Budget your time - Laboratory time is valuable and limited. The laboratory is neither the time nor the place to be wondering what to do or to be reading an experiment for the first time; and 3) Try first, seek help second - You will never become proficient in this course if you continually rely on others to answer or figure out everything for you. However, when needed, don't hesitate to ask for assistance. The skills you learn and refine in this course are foundational to much of your future work in science.

Chemistry 237 Notebooks and Reports

(should be written in black permanent ink)

Prelab outline

1. **Title**
2. **Reference:** Cite source of procedure (i.e. experiment or project number)
3. **Reaction(s):** Write a balanced chemical equation for all reactions to be performed.
4. **Table of Reagents:** A table should be set up listing the molecular weight of each compound to be used, the mass to be used, the number of moles that this amount represents, and pertinent physical properties (bp, mp, density, etc.). For solvents, list amounts to be used (if applicable) and physical data (bp and densities), but you do not need to determine the number of moles. Also include a line for the molecular weight and physical properties of the product. Finally, make a note of any hazards associated with any of the materials to be used.

for example:

Compound	MW (g/mol)	amount to be used	moles to be used	Physical Constants
benzophenone	182.21	10.0 g	0.0549	mp = 48 °C
2-propanol		60 - 70 mL		bp = 82 °C d = 0.785 flammable
acetic acid	60.05	1 drop		corrosive
Benzopinacol (product)	366.44			mp = 189 °C

5. **Procedure:** Write a description of the procedure to be used. This description should provide enough detail that the experiment could be carried out with only this information. This section should be written on the left side of the page to provide room on the right side to record any changes made to the procedure and observation.

Notebook

6. **Observations:** Describe any important events that occur that are not written in the procedure. The actual amounts of chemicals used should be recorded to the right of the appropriate line in your procedure. Any measured physical properties (mp, Rf, etc) should be entered where appropriate.

Report

7. **Theoretical Yield:** The theoretical amount of product that should be formed based on the amounts of reactants **Actual** actually used.
8. **Yield:** Express as a percentage of the theoretical yield (% yield).
9. **Results and Discussion:** Write a **succinct** description of what happened. Write reaction mechanisms where appropriate. Present spectral characterizations and measured physical properties (mp, etc). Compare these to those expected for the product and comment on any discrepancies. Include copies of any spectra that were recorded. For most labs, this section should be 1-2 paragraphs.

**Class Schedule
Chemistry 237
Fall 2003**

Week of	Experiment	Reading Assignment
August 25 th	Check-in	Techniques 1 & 2.1 <i>Mohrig, et al</i> Introduction
September 1 st	Labor day, no labs	
September 8 th	Safety Quiz Experiment 1 (50 points) Extraction and purification of caffeine from tea	Technique 1 Experiment 1 Techniques 3, 4, 5, 6, & 8
September 15 th	Experiment 2 (100 points) Hydrolysis of an unknown ester	Project 1 Techniques 3, 4, 5, 6, & 7
September 15 th	Experiment 2 (continued)	Techniques 3, 4, 5, 6, & 7
September 22 nd	Experiment 3 (100 points) Synthesis of bromoaniline and NMR analysis	Experiment 17.2 + Optional Experiment Techniques 5 & 6
September 29 th	Experiment 3 (finish) NMR analysis of products	Spectroscopic Method 2
October 6 th	Experiment 4 (100 points) Synthesis and dehydration of 3,3-dimethyl-2-butanol	Project 3 Technique 11 Also techniques, 7, 2.4
October 13 th	Experiment 4 (finish) GC analysis	Technique 11 Also techniques, 7, 2.4
October 20 th	Experiment 5 (100 points) Grignard synthesis of benzhydrol and TLC and IR analysis	Experiment 13.1 & 13.1a Techniques 3, 4, 5, 6, & 10
October 27 th	Experiment 5 (finish). Experiment 6 (50 points) Aldol condensation: Synthesis of dibenzalacetone from acetone and benzaldehyde.	Project 5.1 Techniques 5
November 3 rd	Experiment 6 (finish). Experiment 7 (50 points) Thiamine-catalyzed benzoin condensation	Project 6.1 only Techniques 3, 5, & 6
November 10 th	Experiment 7 (finish) Experiment 8 (50 points): Spectroscopic structure determination	Spectroscopic methods 1 & 2
November 17 th	Experiment 8 (finish) Check out (failure to check-out will result in a \$25 charge to your student account)	
November 24 th	Lecture will meet as usual: Review	
December 1 st	Final examination	