ORGANIC CHEMISTRY LABORATORY 221 L
Fall 2008

Instructor	Ms. Brenda Harmon 220A Pierce Hall 4-8341	**Office Hours** Tues and Wed 10:30-12:00 and by appointment ***Drop-in Mon., Tue., Wed. during labs (2-4)

"In theory, there is no difference between theory and practice.
In practice, however, there is."
- Jan van de Snepscheut

Laboratory Text

- Pre-lab reading materials and questions will be made available via a blackboard site
- *Carbon-copy notebook, a three-ring binder, and instructor approved safety glasses are required.

A liberal-arts intensive laboratory course for organic chemistry

This course is taught in a very different format to most standard organic chemistry laboratory courses. Many laboratory courses focus on developing techniques and applying them (given detailed, rote instructions) randomly to many different synthetic reactions discussed throughout lecture. Sort of a "show and tell" approach. This laboratory course, in line with the Oxford College mission statement, takes a liberal-arts intensive approach.

The focus in this course is in developing a rich understanding of the chemistry behind the techniques and connecting the macroscale (what you see and do in lab) to the microscale (the theories and concepts from lecture). Instead of following detailed procedures, students are guided to develop their own procedures and to develop the disciplined habits of mind of a scientific researcher.

Instead of focusing on synthetic methods important only to students majoring in organic chemistry, experiments and synthetic procedures have been selected that highlight the importance of organic chemistry on a broader scale - in consumer products, environmental concerns, and biological and health science topics.

Course Objectives

Students can benefit in many ways from taking the organic laboratory course:

- Learn to *think like a chemist* by applying material covered in the general chemistry courses and the organic lecture course to real laboratory situations. This application (with real understanding) is what chemistry is all about.
- To think about, understand, and evaluate matter on both a macroscopic and a microscopic scale. To describe chemical phenomena on both a microscopic and macroscopic scale.
- To develop the disciplined habits of mind that characterize scientific thinking skills.
- Build organizational, analytical, and problem solving skills using chemistry specific approaches.
- Develop scientific writing and record keeping skills. To strengthen your skills in communicating analytical results in a clear and concise manner.
- Develop the ability to observe closely and use scientific insight.
- Develop oral and written communication skills working with a team of peers.
- Develop new laboratory skills.
- Understand the need for safe laboratory practices involving chemicals and their conditions for use.

Content Objectives

Students will be expected to master the following techniques of experimental organic chemistry and to understand the chemistry that makes each physical separation or analysis work:

Separation and Purification
- Recrystallization
- Extraction
- Chromatography

Identification
- Melting points
- Chromatography

Grading Methods and Course Requirements

Each lab session (there are 11 sessions) is worth 100 points:
- 60 points notebook and instructor evaluation
- 20 points quizzes
- 20 points post lab writing assignment

Total points from lab grades = 1100 points (you will be able to drop your lowest lab grade)

Total lab grades	1000 points (67%)
Written lab final	300 points (20%)
Lab practical (caffeine)	200 points (13%)
Total points for the course	1500 points

Grades are based on percentages and usually assigned as follows:

93 - 100% A	78 - 80% C+
90 - 92% A-	74 - 77% C
88 - 90% B+	70 - 73% C-
84 - 87% B	68 - 70% D+
80 - 83% B-	60 - 67% D
	Below 60% F

Quizzes

Pre-lab Quizzes

A 5-question quiz will be given at the beginning of each lab period to determine your level of preparation. You will be allowed to use the procedure and table of reagents sections of your laboratory notebook to answer three questions specific to the procedure. Two further questions will investigate your understanding of the material. The quiz will be followed by a brief discussion of the quiz questions and a 20-30 minute lecture about the concepts, techniques, and procedures to be followed for that lab session.

Post-lab Quizzes

A 10 minute quiz will be given at the end of most laboratory sessions. These quizzes will cover the concepts behind the experiments or techniques just completed and may include concepts from previous experiments. Much of the information learned in this lab class is cumulative; therefore you will be held responsible for these thematic concepts throughout the semester. These quizzes may or may not be announced.

Post-lab Writing Assignments

In this course, it is not sufficient to come to lab, blindly follow the procedures, and turn in data. The most important aspect of this course is for you to understand the chemistry behind what you are doing and to use and further develop scientific thinking skills. Post-lab writing assignments will include: summaries of what you did, how you did it and your results; similar summaries written in third-person, past -tense, passive-voice; and complete scientific papers. Guidelines will be handed out at the time of the assignment.

Written final exam

Everything you learn in this course is interconnected. Every technique builds on everything else. You will be learning a series of techniques that you will have to use and apply throughout the year. Not only do you need to learn HOW to perform all the techniques, you must understand the

chemistry behind them. Consequently, you will be tested on your understanding and application of these techniques in an hour long written exam.

Lab Practical

Since this is a laboratory course, it doesn't seem fair to grade you totally on written work. Consequently, close to the end of the semester you will be given a laboratory practical exam that will present a problem requiring you to use the following techniques: *extraction, recrystallization, melting point, and thin-layer chromatography*. You will be evaluated by the instructor on: planning and organizational skills, knowledge, confidence, safety skills, technique, and conclusions.

Instructor Evaluation

Since this course is student-centered your attitude and performance can affect the other students. During the course of the semester the lab instructor will evaluate you in the following areas: attitude, being well prepared, being on time, following the safety rules, working efficiently, finishing on time, leaving the lab clean, working well in a group situation, working comprehension of the subject matter, scientific thinking sills and technique.

Attendance

Attendance during your assigned scheduled lab time is mandatory. There will be no make-up sessions for lab. In the event of extenuating circumstances (e.g. a serious illness) arrangements that do not involve a penalty can be made with your instructor. It is the student's responsibility to let the instructor know PRIOR to the missed lab any extenuating circumstances. If the instructor is not contacted **prior** to the missed lab the student will receive a zero for that lab. NO exceptions!

Late Work

If work is turned in late, the penalty is one letter grade per day. In the event of extenuating circumstances penalties may be waived. This will be determined on a case-by-case basis.

Honor Code Policy

Lab sessions are a perfect place to promote and utilize collaborative learning. You are encouraged to discuss the experiments with others before lab (group study) and while in lab. However, your laboratory notebook, lab summaries, and scientific reports, including calculations, are to be **your work alone**. You should treat them as you would a take-home test. Collaboration on any report is a violation of the Oxford College Honor Code and will be treated as such. This rule applies to any portion of reports from previous semesters as well as papers available over the internet. Your name on your lab report is your pledge that the work is yours and that you did not give or receive unauthorized assistance. The usual penalty for students who are found to have violated the honor code is an automatic F in the course.

Group Work

You will be asked to form small groups for working in and out of organic lab. You will perform most of the procedures by yourself or in pairs, but you will prepare, discuss, and evaluate the procedures in small groups of 4-6 students. The groups will have two primary activities.

I. You will be asked to meet with your group *before* your lab day to work on assigned problems. You should be completely prepared for lab when your group meets so that you can fully contribute. The reason for this group meeting is to allow you to think about what you are going to be doing in lab and to discuss it BEFORE coming to lab. This should enhance the learning experience since you will get more out of lab if you come in with some prior understanding of the procedure.

II. You will work with your assigned group on many activities during lab. You will discuss and evaluate the procedures and concepts during lab in these larger groups.

Tenative Organic Lab Schedule

Fall 2008

Week of:	Topic
Sept. 1	
Sept. 8	**Intro/Notebooks/Safety/Check-in**
Sept. 15	Column Chromatography I Separating Koolaid dyes
Sept. 22	Thin-layer Chromatography Identifying Unknown OTC Drugs
Sept. 29	Column Chromatography II Isolating lycopene from tomato paste
Oct. 6	Liquid/liquid Extraction (mini-scale)
Oct. 13	**NO LABS**/*Fall Break*
Oct. 20	Acid/Base Extraction (micro-scale)
Oct. 27	Recrystallization (mini-scale) & mpt
Nov. 3	FDA Assignment I
Nov. 10	FDA assignment II
Nov. 17	**Lab Practical:** Isolating Caffeine from Coffee
Nov. 24	**NO LABS**/*Thanksgiving break*
Dec. 1	***Finish Lab Practical*** **Written Final Exam**
Dec. 8	**No Labs!**