CHEM 245L (Honors Laboratory)

Fall 2017

Honors Laboratory in Separations and Analytical Characterization of Organic and Biological Compounds

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CHEM 245L (Honors Laboratory):

Lecture: F 9:05-9:55am **Location:** Kenan B121
Lab: M 1:25-4:15pm **Location:** Morehead Labs 203

Teaching Assistant: Megan Ford
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COURSE OBJECTIVES

Project-based laboratory comprised of multiple sessions with a unifying research theme – aimed at developing basic research skills while simultaneously inspiring students with real-world connections to the lab-based exercises

- To provide students with the opportunity to learn a variety of chromatographic and spectroscopic techniques.
- To provide students with an opportunity to develop practical laboratory skills.
- To teach students how to make reliable and accurate observations and measurements.
- To teach students how to interpret and report experimental results in a scientific manner.
- To continue developing a students critical thinking and problem solving skills.

In this research exposure course, you will be working with a Graduate Research Consultant who will assist you in the research project. The GRC Program is sponsored by the Office for Undergraduate Research (http://our.unc.edu), and you may be able to use this research exposure course to meet a requirement of the Carolina Research Scholars Program (http://our.unc.edu/students/crsp). I encourage you to visit the OUR website to learn about how you might engage in research, scholarship and creative performance while you are at Carolina.

LAB CHECK-IN

- Lab check-in: **Monday – Aug 28 at 1:25pm (Morehead laboratories 203).**

COURSE PRE- AND COREQUISITES

Prerequisites: Chemistry 101, 101L, 102 and 102L.
Corequisites: Chemistry 241H.

It is an honor code violation to be enrolled in a course while lacking the proper pre- or co-requisites. **Note:** If you drop Chemistry 241H or switch into a Chemistry 241 class you must drop Chemistry 245L.

Requirements for the course:

- A version of the CHEM 245L lab manual will be made available to you via Sakai. You will need to print it and bring it with you each lab session (print no more than a week in advance, as changes to the manual may be made as the course progresses). You will be responsible for reading and preparing for each lab before we meet. Preparation includes answering the prelab questions that precede each lab and outlining the experiments for the given lab period.
- Laboratory notebook. Your notebook should be bound, the pages must be pre-numbered and it must have carbonless duplicate pages. All data, calculations, and drawings should be entered directly into your notebook.
- Harris, D. C. *Quantitative Chemical Analysis*, 9th ed.; W.H. Freeman: New York, 2010. - **Lecture Text**.
- Scientific calculator.
- Laptop computer. There are a number of experiments you perform in this laboratory course that require you to have your laptop. Every student is required to bring their laptop computer when instructed, regardless of whether you will be working with a partner or in groups.
- Lab goggles (not safety glasses)
    - If you have never had a chemistry lab at UNC you will receive a free pair the day of lab check-in. You will receive instructions during the lab check-in lecture. If you have had a chemistry lab at UNC and you forget your lab goggles you will have to go to Morehead Labs 102 and purchase a new pair.
- Lab Coat
    - You will be provided with a disposable lab coat at the beginning of each semester. Lab coats must stay in the lab room, they may not be taken with you when you leave lab.

SAKAI

- The 245L syllabus, software, announcements, grades and other important lab information will be available on Sakai (https://sakai.unc.edu). Lab reports are submitted through the "Assignment" feature on Sakai.

ATTENDANCE

Attendance is mandatory. Due to the strict scheduling of the course and the progressive, building, nature of the techniques learned, you must be in lab at your assigned time. Please be punctual. Lab starts at 1:25 pm on the dot, so be there, and be ready to participate.

STUDENT EVALUATION

Given that the laboratory portion of this course is the major focus of this experience, it is fitting that your grade will be determined by your efforts in the lab. There are four components to your grade:

1. PARTICIPATION 20 %

This includes: participation in lab lecture, lab notebook grades, punctuality, lab preparedness, participation in lab, and prelab write-ups. Note that each TA will also be observing your technical skills during the semester and evaluating your practical skills. Your TAs and I will come up with a composite score equal to one lab notebook grade based on your technique. We should not have to tell you 100 times during the semester how to read a pipette volume, for example.

2. Weekly Lab Reports (9 total) 60 %
3. Comprehensive Lab Paper 15%
4. Group Research Poster Presentation 5 %

Total **100 %**

- Your TA will grade all your reports and assignments throughout the semester. However, the lab instructor, not your TA, will determine all final lab grades.
- You will be assigned a letter grade based on your standing in the lab section.

GROUP WORK

Group work will be an integral part of this lab and your laboratory experience. Each student will be assigned to a group during the first lab period and will remain with that group throughout the semester. All the lab work will be carried out as a group. The reason for the emphasis on group work is to teach you to work efficiently as a research team in order to achieve a common goal.

During a typical lab period there is a lot of work to be accomplished in only a 3-hour period; standards must be prepared, glassware must be cleaned, samples must be prepared for analysis, computers and instruments must be set up, and calculations must be performed. The only way to complete all the required work and accomplish the goals of the lab is to work effectively as a team. This will mean learning to lead in some instances and to take a supportive role in other instances. It also means that each group member must listen to their fellow group members and allow everyone to contribute. A portion of your lab grade will be based on your ability to work in a group and to achieve the set lab goals as a group. I should emphasize that your group work grade is not simply based on your ability to work together, but to achieve the experimental goals of the lab (lab performance).

PRE-LAB ASSIGNMENTS

- A pre-lab assignment will be due at the beginning of each lab period. Read the "Pre-Lab Assignments" section in the ***Policies & Procedures*** chapter of the Chemistry 245L lab manual for specific criteria about how to complete the pre-lab assignments.

LAB NOTEBOOKS

- Students must turn in the duplicate pages from their lab notebooks at the end of each lab period. If you leave lab without submitting your lab notebook pages, you will receive a zero for that experiments lab notebook grade.
- The specific requirements for how to maintain a lab notebook, as well as what should go into the lab notebook, are provided in the lab notebook section of the ***Policies & Procedures*** chapter of the Chemistry 245L lab manual.

LAB REPORTS

- Lab reports will be discussed in much more detail as the course progresses. These reports will comprise 60% of your final grade; therefore, a great deal of care must be taken in preparing them. You may cite outside sources in your reports, but make sure to cite them. Remember, plagiarism is a violation of the honor code. In sum, when in doubt--cite a reference.
- Some criteria for how to write the lab reports are provided in the ***Policies & Procedures*** section of the Chemistry 245L lab manual.
- Lab reports are submitted electronically through the "Assignment" feature on Sakai.
- Lab reports are due <u>one week</u> after the scheduled completion of the experiment, unless stated otherwise.
- In many instances this semester you will work with a partner to carry out an experiment and acquire data collectively. However, there is no collaboration on the writing of lab reports, this includes working up the data, answering experiment questions, or sharing plots. All the work within your report must be your own.
- If you are having difficulties writing your report or have questions, seek help.
- **LATE LAB REPORTS:** Lab reports turned in late will be **penalized 10 % per day**. Late lab reports must be submitted <u>no later than 48 hours past the scheduled due date</u>, unless an extension has been given. After 48 hours, a report that has not been submitted will receive a zero. You may email Dr. Hicks to request an extension. Extensions are granted on a case-by-case basis and only extenuating circumstances are considered.

RESEARCH PROJECT, PAPER & PRESENTATION

- Each group will be assigned a real world research project at the beginning of the semester and will have the entire semester to work on their research project. The goals of the research project are to provide students with an opportunity to solve a real problem, to learn various analytical methods must be used to solve the problem, and to provide students with an opportunity for guided independent research. Each team will express, purify and characterize (through various biochemical and analytical approaches) a kinase enzyme that is not yet understood in the organism of origin (the model algae *Chlamydomonas reinhardtii*).

Tentative Laboratory Schedule.

Aug 28	Check-in; Lab 0
Sept 11	Session 1: Protein Expression;
Sept 18	Session 2: Cell Lysis and Affinity Purification;
Sept 25	Session 3: Protein Quantification;
Oct 2	Session 4: SDS-PAGE;
Oct 9	Session 5: Protein Digestion;
Oct 16	Session 6: Peptide Extraction; Desalting (SPE)
Oct 23	Session 7: LC-MS/MS;
Oct 30	Session 8: Database searching / Data Analysis and Interpretation;
Nov 6	Session 9: Activity Assay;
Nov 13	Poster Workshop
Nov 20	Final Lab Report Workshop
Nov 27	Poster Symposium / Final Lab Report Due

- Each student will write a formal research report on their project and findings. I encourage you to take some time and visit either the Health Science library or the Chemistry library and read some primary literature. The benefits are two-fold, not only will you get a feel for how research papers are written, but you will learn your way around the current literature which will expose you to how the techniques your are currently learning are actually used.

- Each group will present their data at a poster symposium for faculty, graduate students and fellow students.

There will be a number of discussions regarding the research project and presentation throughout the semester.

HONOR CODE and ACADEMIC INTEGRITY

The Department of Chemistry faculty adopted the following policy on September 9, 1977.

"Since all graded work (including homework to be collected, quizzes, papers, mid-term examinations, final examination, research proposals laboratory results and reports) may be used in the determination of academic progress, no collaboration on this work is permitted unless the instructor explicitly indicates that some specific degree of collaboration is allowed. This statement is not intended to discourage students from studying together or working together on assignments which are not to be collected."

When writing up your lab report there is no collaborative work. You must write your own report, answer your own questions, and work up your own data. If you are having difficulties or have questions you need to see your TA for help. In those cases when you work with other students, you must clearly indicate on your Title Page who your partner or partners were.

Plagiarism: The submission of any material that is substantially the same as some other written document or source (i.e., a journal article, a textbook, a lab manual, a book) that is not properly referenced constitutes a violation of academic integrity. Furthermore, simply rearranging the words from a source to make them seem like your own words is also plagiarism.

The following situations below will be treated as honor code violations.

- Unauthorized collaboration. All lab reports must be written independently.

- Plagiarism. The ideas presented in your report must be your own. If you present someone else's ideas or work (from books, old lab reports, the Web, the lab manual) as your own, this is plagiarism. You can present facts from an outside source, as long as you properly reference the source.

- Do not rearrange a paragraph or some other piece of work that is not yours in the hope of disguising the work as your own.

Established by the UNC Undergraduate Labs Committee
April 2014