

# CHEMISTRY 313

## Analytical Chemistry Laboratory

### Syllabus

### Fall, 2009

**Professors:** Drs. Robert Carter and Deyang Qu  
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**Telephone:** 617-287-6130; 617-287-6035  
**Office hours:** MWF 9:00-10:00 (Dr. Carter)  
MWF 11:00-12:00 (Dr. Qu)  
**Office:** S/1/78 (Dr. Carter), S/1/129 (Dr. Qu)  
**Class:** Analytical Lab, CHEM 313  
**Lecture:** M 12:00-1:20 in W-2-200 (attendance mandatory!!!)  
**Labs:** Section 1: M 1:00 pm-4:00 pm in Science 2-047  
Section 2: Tu 9:30 am-12:30 am in Science 2-047  
Section 3: W 1:00 pm-4:00 pm in Science 2-047

#### Objective:

This course will focus on chemical analysis theories and techniques. Both traditional wet-chemistry approaches and instrumental methods will be covered. Students will perform quantitative and qualitative analysis of a variety of different. Statistical data analysis will be introduced and applied throughout the course. Emphasis will be placed on principles and application of different analytical methods, including statistics, acid/base and redox titration, spectroscopy, and potentiometry. I hope you will enjoy the semester.

**Chemistry** is an **experimental** science; i.e., lab work is an integral part of the discipline. Thus, to address the various aspects of the objectives, the laboratory experience in this course is designed to:

- Impart a hands-on illustration of standard wet-chemistry and instrumental analytical methods.
- Provide experience using readily available resources to determine proper methods for safely handling and disposing of materials, while putting those methods into practice.
- Develop analytical thinking/problem solving **processes** and the ability to communicate those thoughts effectively to others.
- Promote team skills through cooperatively working together in small groups.
- Refine basic laboratory techniques necessary to perform analyses safely and efficiently, while attaining the highest accuracy and precision a technique will allow.
- Develop the fundamentals for maintaining a proper laboratory notebook and for reporting results with the proper use of statistics.

**Text:** Quantitative Chemical Analysis, 7<sup>th</sup> Edition by Harris

**Optional:** Applications of Microsoft Excel in Analytical Chemistry, by Crouch and Holler.

**Lab Manual:** Available on-line

### Grading:

10 lab reports; 100 pts each

Notebooks will be collected and graded twice, 100 pt each

Final Exam based on the 10 lab experiments, 300 pts

### Grading Scale:

Grade	Total Points
F	<900
D-	900
D	960
D+	1005
C-	1050
C	1110
C+	1155
B-	1200
B	1260
B+	1305
A-	1350
A	1410

**Attendance:** You are expected to attend all lectures and labs. **There will be no make up labs!** If you miss a lab **for any reason**, you will be given data necessary to produce a lab report and you will take a **20 point penalty** on your report for that experiment.

**Academic dishonesty:** *“It is the expressed policy of the University that every aspect of academic life not only formal coursework situations, but all relationships and interactions connected to the educational process shall be conducted in an absolutely and uncompromisingly honest manner. The University presupposes that any submission of work for academic credit indicates that the work is the student’s own and is in compliance with University policies.....”* You are expected to do the work with your partner, to record your OWN observations. It is OK to get help on a question from a classmate, but it is not OK to copy an answer off of a classmate’s (including your partner’s) report. If there is any question in your mind about whether or not the action you are about to undertake constitutes cheating, IT DOES, and DO NOT PROCEED!!

**Lab reports:** Much of your data manipulations will be performed on an Excel spreadsheet. If you are not already an expert, you will learn to be efficient at Excel during this course. Your reports are required to contain the following elements.

- Data Table
- Graphs
- A summary of your findings
- Answers to any questions
- An Excel spreadsheet containing your calculations

***Your lab reports consist of a MS-word document for the report (2-page maximum, 12pts, single-space) and an Excel spreadsheet for data and treatments (use the template posted in the course website). Both should be sent to me via e-mail. Both MS-Word and Excel files should be name as: your first name last name lab No.; e.g., John Smith lab2. Five points will be taken for the second offense of wrong file name. The lab report is due in 14 days. NO late report will be graded.***

**Lab schedule:**

9/14, 9/15, 9/16	experiment 1	t-table
9/21, 9/22, 9/23	experiment 2	statistical analysis of pennies
9/28, 9/29, 9/30	experiment 3	Fajans determination of chloride
10/5, 10/6, 10/7	experiment 4	preparation of standard NaOH and analysis of vinegar
10/19, 10/20, 10/21	experiment 5	histidine
10/26, 10/27, 10/28	experiment 6	assay for phenol
11/2, 11/3, 11/4	experiment 7	Spectrophotometric iron Analysis
11/16, 11/17, 11/18	experiment 8	Spectroscopic determination of salicylic acid in aspirin
11/23, 11/24, 11/25	experiment 9	Solubility of calcium sulfate - titration (1)
11/30, 12/1, 12/2	experiment 10	solubility of calcium sulfate - ISE (2)

**Notebooks:**

You are required to keep *two* bound notebooks for this course.

The first page should be a table of contents. Entries for each experiment should be dated at the top, have a few sentences that describe the goal of the experiment, contain the tabulated data, and any calculations that were performed *during* the course of the experiment. Label everything neatly. **Use blue or black ink ONLY!** If you make a mistake in your notebook, DO NOT SCRIBBLE the mistake out. Simply put a single line through the entry. Your notebook will be collected and graded twice; first lab book will be collected in the week of 10/22 and second lab book should be handed in with the last lab report.