

# SYLLABUS

## CH109 General and Quantitative Analytical Chemistry Lab Fall 2009

Welcome to CH109 General and Quantitative Analytical Chemistry Lab. This is the first semester of a year-long laboratory course intended for physical/biological science majors, pre-medical students, and engineering students, who require a one-year course in chemistry. This syllabus is designed to answer many questions you may have. Please read it over and then keep it handy to use throughout the semester.

### Course Staff

This course is given by Dr. Binyomin Abrams:

Office Hours: Tues/Thurs 3pm-4pm and Wednesday 10am-11am in SCI 484C (and by appointment)

Communication: abramsb@bu.edu (e-mail, preferred) and 617.353.2480 (office phone)

Course Website: <http://people.bu.edu/abramsb/courses/CH109/>

The teaching fellows that will serve as the lab instructors are:

Breia Salsbery (L1, L5) lewisb@bu.edu (Thursday 3:30pm-4:30pm in LSE 804)

Shaun Cote (L2, L6) shaunc@bu.edu (Tuesday 11am-12noon SCI 373)

Han Xiao (L3, L7) hanxiao@bu.edu (Monday 11am-12pm in SCI 517)

Robert Azad (L4, L8) razad@bu.edu (Thursday 10am-11am in LSE 7th)

All members of the course staff are available for consultation during their office hours (listed above) and by appointment. Also, we will make every effort to respond quickly to e-mail inquiries.

### Texts and Equipment

The required materials for the course are available at the Boston University Bookstore:

1. Abrams, B. *General and Quantitative Analytical Chemistry Lab I, 1st ed.*; Kendall-Hunt: Dubuque, IA 2009.
2. Laboratory notebook, Hayden McNeil Publishing, ISBN 1-930882-23-8.
3. Approved face-forming safety goggles (UVEX Futura)
4. Lab coat
5. Scientific calculator (capable of logarithms and exponents)

All of the above items are required by all students. You must have procured these items *before* the first lab session.

## Course Information and Policies

### E-mail Correspondence

Periodic e-mails will be sent to the entire class using the BU-link (registrar's online information system). Make sure that you check your BU e-mail address regularly so that you do not miss any important messages.

### Course Schedule

The detailed course schedule can be found on the course website and at the end of this document.

The course consists of two required components:

- Pre-lab lecture (W 12noon-1pm in KCB 101), and
- Lab (M/T 1pm-5pm or 5:30pm-9:30pm in SCI 346/348).

You are required to attend **all** of the lab meetings of your **registered section**. You are highly encouraged to attend all of the pre-lab lectures; while attendance will not be taken, important details (that will not necessary be disseminated at any other times) will be discussed.

If you have not yet registered for both components (4 components in total including lecture and discussion) of the course, please do so right away. Failure to be registered for a single component makes it impossible to assign a grade at the end of the semester.

### Absence Policy

Attendance at all labs is mandatory. You are required to attend your registered section for all scheduled lab experiments unless you have a legitimate reason for absence. If you unsure whether a reason for absence is "legitimate", consult the professor. The professor's (and only the professor's) permission is necessary for any absence from your registered lab section<sup>1</sup>. Furthermore, he may require written evidence be produced to substantiate an absence.

Please notify the professor about scheduled absences in advance and, preferably, in person. For unscheduled absences please notify the professor by e-mail in advance or as soon as humanly possible. If you wait too long before notifying the professor, then you may miss the window for a makeup lab. In such a situation even a student with a legitimate excuse will be unable to perform the lab NOR receive credit! Be responsible and make arrangements in advance or as soon as possible.

If the absence is deemed unacceptable by the professor, the student will receive no credit for the lab and forfeit all points associated with that experiment.

Students are not permitted to attend lab sections other than their registered section, without advance permission from the lab director. Attendance may occasionally be taken in lecture and will count towards your grade. If you arrive late to lecture, please enter as inconspicuously as possible. Your colleagues will appreciate it.

#### *What happens if I miss a lab (for a legitimate reason)?*

- First, a legitimate reason is defined as an emergency (medical or familial) that precludes attendance. If you need to miss a class for a religious observance, please advise Prof. Abrams as soon in advance as possible. If you are unsure whether a reason for absence is "legitimate", consult Prof. Abrams.
- Second, you must inform the professor **as soon as possible**<sup>2</sup> after the absence<sup>3</sup>. The professor's (and only the professor's) permission is necessary for any absence. You will be required to provide corroboration of your claim.
- Finally, if the reason for absence is accepted then you will be required to *make up the lab*.

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<sup>1</sup>In other words, please don't ask permission from teaching fellows. They will simply send you to the course instructor!

<sup>2</sup>If you wait too long before notifying the professor, then you may miss the window for a makeup exam/quiz. In such a situation, even a student with a legitimate excuse will be unable to receive credit for the missed work. Be responsible and make arrangements in advance or as soon as possible.

<sup>3</sup>Holiday absences must be discussed in advance.

## Academic Conduct

All students at Boston University are expected to maintain high standards of academic honesty and integrity. It is the responsibility of every student to be aware of the Academic Conduct Code's contents and to abide by its provisions, as detailed at:

<http://www.bu.edu/cas/academics/programs/conductcode.html>

Please note carefully that we treat cheating<sup>4</sup> with **zero tolerance**. At minimum, the consequences of cheating are that the score for work on which cheating occurs counts as zero and that a letter detailing the cheating is sent to the student's advisor, the dean of CAS, and placed in the student's academic file. Possible further consequences are referral to Academic Conduct Committee, and additional penalties, including possible expulsion from university. None of these consequences are at the discretion of the instructors, but rather are governed by Boston University's policies.

## Academic Integrity in Lab Classes

Unacceptable conduct in this lab course includes, but is not limited to, the following behaviors: (1) Misrepresentation or falsification of lab data, (2) Quoting or copying from an external source such as a paper, website or textbook without citing the source, (3) Misrepresenting someone else's work as your own: note, knowingly allowing someone else to represent your work as their own is also considered plagiarism.

To avoid the above scenarios, keep in mind the following guidelines:

- Students will often work in pairs in lab and form study groups. It is appropriate and encouraged for students to have discussions about procedures, observations, and data analysis — this is a valuable way to aid understanding and learning of the material. Work turned in for grading must however be your own work in your own words and not just copied from somebody else.
- Pre-lab assignments are very often the source of the most academic misconduct. The work that you turn in for these assignments must be solely your own. That does not preclude having discussions with your colleagues about how to approach certain problems. It does, however, mean that there should be no detection of the collaboration in the final products.
- Students are encouraged to consult external sources for writing lab reports. Always keep a note of where you obtained the information from, and cite the source in your lab report. Direct quotes from a source should be used sparingly and if used should always be enclosed in “ ” marks with a citation. In general it is best to summarize the information in your own words.
- Data should be recorded directly into your notebook as it is measured and not copied into your notebook after the fact. If corrections need to be made due to error, neatly draw a line through the erroneous data and make a brief note of why this was necessary.

## Safety and Course Pedagogy

A discussion of lab safety guidelines and the course pedagogy can be found in the forematter of your lab manual.

## Breakdown of the Lab Components

### Pre-lab Assignments

Consider these your admissions ticket to the lab. These will typically consist of a few calculations, or questions, that are relevant to the lab that is about to be performed. These assignments must be turned into the class TF at the beginning of the lab section and are individual work only. No pre-lab, no admittance. Students arriving more than 15 minutes late may not be allowed to attend the lab.

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<sup>4</sup>Here, “cheating” refers to any violation of the student academic conduct code. There are no *small* infractions.

## Quiz

The quizzes will be approximately 10 minutes in length. The nature of these quizzes will be discussed during the pre-lab lecture. I prefer to have the quizzes cover the pre-lab material of the lab about to be performed. I do, however, give the option to have the quizzes cover the *previous* lab's material. This will be at the your discretion. A good understanding of the procedure and any calculations necessary for the lab will be needed.

## Post-lab Assignments

These assignments will generally be either (1) a series of questions related to the lab and your data, or (2) a formal lab report. All post-labs must be typed. Post-lab assignments are individual work only and are generally due by the start of the section 1 week after the lab was completed. Exact due dates will be announced! Late assignments are be penalized on a sliding scale starting the moment that they are late. It is better to turn in an incomplete assignment than to be late.

## Notebook

All work in the lab must be done directly from your notebook. Use of the lab manual will result in a large deduction from your lab performance grade! The duplicate notebook pages must be submitted before leaving the lab.

Notebook pages should be completed before arriving to avoid deductions and must include:

1. Title of experiment, name, date, and lab section;
2. Objective: a short paragraph describing the goal of experiment;
3. Procedure: a detailed summary of the experimental procedure. This does not need to be a complete transcript of the experimental procedure, simply enough information to perform the experiment. Diagram the apparatus if applicable;
4. Hazards: any and all chemical, or physical, hazards related to the experiment must be listed and explained;
5. Waste disposal: a detailed description of how all the waste components will be handled.

During the lab, the following should be recorded:

6. Name of partner (if applicable)
7. Observations: note all observations from the experiment: times, colors, temperatures, deviations from the written procedure;
8. Data: all data must be recorded directly into the notebook. Use tables (constructed before the lab) when possible. Data recorded on the computers should be endorsed by the TF and submitted with the notebook pages.
9. Calculations: record all preliminary calculations on your data in your notebook.

General Notebook practices:

- Entries should be written in pen, not pencil.
- When you make errors, simply draw a line through the incorrect entry and enter the correct information. (Do not scribble.) It is also useful to provide a reason for the correction, if applicable.
- Do not use whiteout - it doesn't show on the duplicate!
- The entries should be legible
- Information should be organized and clearly labeled.

## Grading

### Overall Lab Grade

The lab is worth 35% of the overall CH109 course grade and will be determined as follows:

Component	% Grade
Labs	70%
Lab Practical Exam	10%
Quizzes	10%
Performance	10%

Letter grades **are not** assigned to individual labs. Your overall lab grade is reported as a raw score and will be combined with the lecture grades to determine your course grade. Course letter grades are assigned based on your total score for the course.

### Individual Labs

Typical experiments will be graded based on some, or all, of the following components: pre-lab assignment, notebook pages, data, and post-lab assignment. Exact breakdowns will be lab-dependent.

### Lab Practical Exam

The lab practical exam is a special in-lab exam designed to evaluate you on your learning of proper lab techniques, basic statistical analysis, and analytical thinking. Details will be supplied at a later date.

### Performance

Your performance during the labs will be evaluated by your lab instructor (TF). It is important to remember that you should work efficiently and safely at all times. Exceptional performance will lead to an increased assessment score.

Infractions in lab safety and etiquette will result in a lowered assessment score. Repeated infractions may result in your ejection from the lab. The following is a list of some of the infractions that will result in a loss of points:

- Arriving after the quiz has begun or forgetting your safety equipment
- Removing safety equipment while in the lab
- Chewing gum / drinking in the lab
- Disposing of hazardous waste down the drain
- Talking back to TF / not following instructions<sup>5</sup>

### Questions Regarding Grades

Any question concerning the grading of a lab must be brought to the attention of the grading TF within a reasonable amount of time (usually 1 week) of when it is returned to you; material will not be accepted for regrading after a long delay.

Be sure that you have made no alterations in your work. Please note that the penalties for academic misconduct are severe, as detailed in Boston University's Academic Conduct Code, available from CAS Academic Advising, Room 105.

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<sup>5</sup>This is completely unacceptable. Students not following the instructions of their TF will be ejected from the lab. This is unsafe and irresponsible. If you feel that your TF is wrong/incorrect: have them contact the course instructor immediately.

## Security

Despite our best efforts, theft of items has occasionally occurred from the entranceway to the lab rooms (especially in 346). Students are advised to leave unnecessary valuables at home and to transfer those that are in bags to their person. A small area will be provided for the storage of 1 jacket/coat and 1 bag per student. Only items necessary for the performance of the labs are permitted in the laboratory.

## Tips and Hints

While many students enter college already well-versed in chemical theory, they often find themselves lacking in some of the most basic fundamentals of experimental techniques. This course is designed to walk a student through the basics of analytical chemistry. There is no pre-requisite knowledge of lab techniques, but they will build-up rather quickly. The best approach is to always make sure that you know what you are doing, and why you are doing it, and if you don't understand something ... ask!

## Detailed Course Schedule

Week of	Monday/Tuesday Labs	Notes
8/31	No labs	First Day of Classes (W) Pre-lab lecture (W)*
9/7	No labs	No classes (M)
9/14	Lab 1: Scientific Measurement	
9/21	Lab 2: Redox Titration of Hydrogen Peroxide	
9/28	Lab 3: Synthesis and Analysis of Alum (part 1)	
10/5	Lab 3 (part 2)	No pre-lab lecture (W)
10/12	No labs	No classes (M) Tuesday is Monday's Schedule
10/19	Lab 4: Modeling dyes: Particle in a box	
10/26	Lab 5: Qualitative Analysis	
11/2	Lab 6: Bicarbonate Content - Gas Laws	
11/9	Lab 7: Beer's Law: Colorimetric Determination of Aspirin	No pre-lab lecture (W)
11/16	Lab 8: Determining Iron Content of Food by AAS	
11/23	Lab 8 (part 2)	No pre-lab lecture (W) No classes (W/R/F)
11/30	Lab 9: Investigating the 1st Law of Thermodynamics	
12/7	Lab Practical Exam	No Pre-lab lecture (W) Last day of classes (F)

\* Pre-lab lectures will be held every Wednesday unless otherwise noted.

This is a tentative syllabus and is subject to change at any time. Students are expected to conform to these instructions and any other instructions given throughout the semester.