

Quantitative Analysis Laboratory, CHEM 214 Fall 2012 Syllabus

Quantitative Analysis Laboratory (1 credit hour)

Prerequisite: Chem 106/102 and 112; Chem 222/224 and 226 as well as completion of lecture Chem 212

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Graduate Teaching Fellows:

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Objectives:

- 1) To acquaint students with some of the classical and modern techniques in analytical chemistry
- 2) To teach wet chemical lab skills, efficiency and planning of experiments
- 3) To teach critical evaluation of experimental results
- 4) To become familiar with conventional data collection in commercial and academic laboratories.

Attendance:

Students are expected to be in attendance for all labs unless told otherwise. Make-up exams and quizzes will not be allowed unless approved by both Teaching Fellow and Instructor.

Laboratory Procedures:

It is the responsibility of the student to print out all lab procedures and have them available for use during each lab. Procedure and relevant information is found on class website (www.conradnaleway.net/chem214).

At the start of each lab period, the procedures and goals for the day will be discussed. Students will also be informed of any specific hazards, waste disposal procedure, and other safety and equipment related concerns. Students may also be given additional handouts that are pertinent to each lab assignment.

It is essential that the student come to lab prepared, having studied the procedure prior to entering the lab and be cognizant of the purpose and procedures specific to that day's lab. Pre-lab quizzes will also be given to assess the preparedness of the individuals prior to the start of each experiment. If it is believed that the student is not adequately prepared to undertake the lab, they will be removed from the lab for additional instruction.

Periodically during class, teaching fellow and instructor will help acquaint students with specific details and methodology to be utilized throughout the lab experiment in order to efficiently and accurately undertake the experimental procedure. **It is critical that students give full attention to these recommendations!**

It is required that students have bound lab notebooks. **Lab notebooks will be collected periodically throughout the semester to be graded.**

In most cases, accuracy will be graded based up the student's ability to determine the concentration of assigned unknown sample whose composition is known to at least **FOUR** significant figures. Good precision (≤ 5 ppt) must be maintained throughout all steps within a lab. **Precision** will be a substantial component of the **lab report** grade. For each lab, it is necessary to report the values of the individual determinations; the mean concentration (or percent composition); and the standard deviation associated with the overall determination. **Accuracy** will be graded based upon reporting the mean value and sample calculations on **BLACKBOARD** as soon as the lab has been completed.

If the student is not satisfied with the score given for accuracy, the lab experiment may be repeated only once in order to get a better grade. However, a **new unknown sample must be used**. It is strongly encouraged that the repeated lab be done as soon after the initial trial as possible and following consultation with instructor and teaching fellows. Results and calculations are again submitted on BLACKBOARD as soon as completed. If a lab is repeated, the accuracy grade will be the better of the two results. Accuracy accounts for about 68% of the overall grade (see breakdown below).

Written laboratory reports will be required for Labs 1, 2, 3, and 5. The purpose of the report is to familiarize students with the aspects of technical writing in the context of critically analyzing what was done in lab. The laboratory report should present what was done, results, conclusions and an analysis of the data in a logical and cohesive manner allowing anyone the ability to pick up the lab report and understand what was done. Inclusive in this goal is that the student is able to analyze at least three possible errors they may have made and be able to demonstrate how those errors impact each of the following steps in the experiment.

The written lab report for Lab 1 may be corrected and resubmitted **only once** to earn back **up to half** of the points lost in the first writing. The corrected lab report must be handed in, accompanied with the original graded lab report and grade sheet, no later than one week after the original was returned to the student. The remaining three lab reports CANNOT be corrected to earn back points.

Laboratory reports are to be computer generated. The suggested report format found in a second handout can serve as guidance for writing the laboratory report. Graded lab reports will determine about 14 % of the overall grade (see breakdown below). Lab reports are to be turned in by the end of lab on the respective due date. **Lab reports turned in late will receive a penalty of 10% each day the report is late and result in a grade of 0 if not received within one week of the established due date.** How lab reports are to be submitted (hard copy, electronically, etc.) will be at the discretion of the Teaching Fellow.

Two exams will be given over the course of the semester. These exams will cover materials in each of the immediately preceding experiments. The midterm exam will include **Experiments 1-3** and the Final Exam will include **Experiments 4-9**. The questions will cover the relevant theory, which will be presented during overview presentations by instructor and teaching fellows, as well as related experimental calculations.

Before the start of each experiment a quiz will be given. Lab Quizzes will also be a part of the overall grade. Questions will generally come from the procedure or calculations related to the lab. In some instances, questions will be asked which do not come from directly from the procedure but require reviewing supplemental materials posted on the website or presented during lab overviews.

Quizzes will be given during the first 15 minutes of lab. You MUST be punctual in getting to lab on time; there will be NO excuses! If you arrive late to lab, you will NOT be allowed extra time to complete the quiz.

Finally, a portion of the overall grade will be earned from an exercise utilizing Excel. The assignment is designed to familiarize the student with Excel and the role it can play in data collection, organization, calculations, and analysis. While this exercise may be contrived, it is important that the student be familiar with the usage of a program such as Excel if he or she has any intention of further work in the sciences, be it other undergraduate level classes, graduate school, and/or a career in the sciences.

Other Materials:

As previous mentioned, it is required that a bound (NO SPIRAL) laboratory notebook be used by each student for procedures, observations, data collection, calculations, etc. relating to each laboratory experiment. It is important that lab notebooks be detailed and organized. **Lab notebooks will be collected periodically during the semester for grading.** Access to an inexpensive calculator having logarithmic, exponential, and trig functions is also suggested. Lab goggles are **required** to be worn in the lab at all times. All items must be brought to every lab session. In some instances it may be advantageous to have a laptop computer in lab for immediate data entry, analysis and calculations. If it is deemed to be a distraction or hazard, the TA or Lab Instructor may request that it be put away. Please note that cell phones are not a substitute for a calculator and will NOT be allowed for use during quizzes, the midterm, or final exam.

Academic Honesty

While it is encouraged that students work together, cheating will not be tolerated. Please review Loyola University Chicago policy on Academic Integrity through the following link:

http://www.luc.edu/academics/catalog/undergrad/reg_academicintegrity.shtml.

Grading Policy

The grading policy established here is subject to change, including but not limited to the assignment of plus and minus grades, at the discretion of the Professor and/or the Teaching Fellow.

Grading Category	Points	Percent
Analytical Findings (Accuracy) 2 @ 100 pts and 7 @ 200 pts	1600	68 %
4 Detailed Laboratory Reports	300	13 %
9 Lab Quizzes	90	4 %
Excel Assignment	60	3 %
Midterm exam	100	4 %
Lab Notebook	100	4 %
Final exam	100	4 %
Total	2350	100 %

Grade Assignment	
Points	
2115 – 2350	A
1880 – 2114	B
1645 – 1879	C
1410 – 1644	D
Below 1409	F

Lab Report Grading Rubric

The following is a rough guideline of how points will be assigned on your lab reports. Redistribution of points from the outline below may occur from lab to lab at the discretion of the Teaching Fellow.

Lab Report Categories	Points
Title and Introduction	5
Materials and Methods	12
Calculations, Results and Discussion	45
Conclusions	5
Grammar	8
TOTAL	75

General Guidelines for Laboratory Reports

Lab reports for Quantitative Analysis should be more complete, accurate, and detailed than reports done in the past for General Chemistry or Organic Chemistry. This is an upper division level science class, and more thoroughness is expected of the student. Lab reports should be written in a stand-alone format, such that, anyone after reading it, would clearly understand what was done and be able to reproduce it.

It is encouraged that the student looks to the current scientific literature to develop strategy on how to structure the lab report. While the main content areas that must be included are calculations and analysis of experimental error is important to structure your lab report into a stand-alone overview of your work. The following elements will aid in structuring a comprehensive lab report. Inclusion of these elements will be considered when grading laboratory reports.

Lab reports should generally consist of the following elements:

1. Title
2. Abstract (not required for this lab)
3. Introduction
4. Materials and Methods
5. Calculations and Results
6. Discussion
7. Conclusions
8. References (include as necessary)

The entirety of the lab report should be written using the student's own words. While it may seem easier to copy certain portions from handouts, such as the methods, this is **plagiarism** and is not acceptable for academic writing, and it is certainly not acceptable for the scientific literature.

When writing the laboratory report it is important to be very clear and concise in your writing. Details do matter and the slightest change in wording may distort the original intent of what was written. It is also important to properly label all tables and figures with descriptive captions as well as making sure the appropriate units are included where necessary. It is suggested that 1 inch margins be used with lines spacing for paragraphs. Individual tables and figures should not be split onto separate pages. Laboratory reports should have good spelling, grammar, sentence structure, etc. Use of personal pronouns (I, we, me, etc.) is strongly discouraged. Finally, take the time to check over your work and re-read your report to make sure that what you wrote is clear and makes sense. If necessary have a friend edit your report as well.

The lab report write-up is a **VERY IMPORTANT** part of any laboratory-based work, especially at the junior/senior undergraduate level and, of course, for graduate and even professional level work.