Syllabus for Chem 214 section 1, Quantitative Analysis Laboratory
Fall Semester 2014

Quantitative Analysis Laboratory, 1 credit hour; Prerequisite: Chem 106 or 102 and 112 and Chem 222 or Chem 224 and Chem 226 or permission of the instructor.

Instructor: Dr. Paul Chiarelli, Flanner Hall 102, phone 508-3106, E-mail: mchiare@luc.edu. Office hours Tuesday/Thursday 1-2:30 PM and Wednesday 9:30-11 AM, or by appointment.

You will need one **bound** laboratory notebook, such as a National-brand composition book sold in Barnes and Noble or Beck's bookstore.

Other Materials: You will need an inexpensive calculator having logarithmic (base 10 and base e), exponential, and trigonometric functions to do routine mole-mass and volumetric calculations associated with this lab.

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) Teach critical evaluation of experimental results.

Laboratory Procedures: The lab will be conducted in FH 313, Monday and Wednesday from 2:45 PM to 5:30 PM. Lab on Tuesday and Thursdays is from 2:30 to 5:15 PM in FH 313. We will provide you with handouts and explain the procedures and goals for each assignment prior to its execution. You will be given handouts that are pertinent to each lab assignment beforehand. The instructor will explain during the first lab period of the semester how the notebook is to be written. In most cases, you will be assigned a standard unknown sample whose composition is known to at least to four significant figures. You will determine the composition of your unknown sample and be graded on how accurately your determinations reflect its true composition. For each assignment, you will report the values of your individual determinations, the mean concentration or percent composition values, and the standard deviation associated with the overall determination. There are no lab reports to write, but you will have to develop your lab skills in order to get a good grade. If you wish to repeat a lab in order to get a better grade, you will need to analyze a new unknown sample.

Laboratory Assignments (in chronological order)

1. Determination of KHP and Sodium Carbonate Unknowns
   A. HCl/NaOH preparation-Determination of Acid/Base Ratio
   B. NaOH standardization against KHP (monopotassium phthalate)
   C. Unknown determinations

2. Determination of Vitamin C by redox titration
   A. Preparation of I_3^- standard solution
   B. Standardization of I_3^- solution
   C. Determination of vitamin C unknown

3. Colormetric Determination of Iron

4. Determination of Calcium and Magnesium by EDTA titration and Ion Chromatrography.

5. Gravimetric Determination of Sulfate.

6. Determination of Zn, Cu, and Pb in a Brass Alloy by Atomic Absorption Spectrometry.

7. Determination of Halomethanes in drinking water by GC/MS.

8. Quantification of target analytes by isotope dilution and LC/MS/MS.

Notes concerning laboratory assignments: **We will be collecting and grading laboratory notebooks periodically. Please come to lab prepared. You should have a brief outline of your procedure for that period written in lab notebook as discussed in an earlier lab period.** When you first go to lab you will be issued a manual outlining the procedures associated with these lab assignments and you are to follow those instructions unless instructed otherwise by your TA. Your grades in lab will be based on the precision and accuracy with which you perform your determinations, so be very careful. In particular you should pay close attention to the proscribed uses of the volumetric equipment and the analytical balance. These two items are involved in almost every determination you perform so learning their proper use at the beginning of the semester is absolutely critical.

Grading: The total grade for the course is based on nine lab assignments and your notebook. Labs 1-6 are worth 70% of your grade (10% each – Lab 1 has two parts). Labs 7 and 8 are worth 14% of your grade (7% each). The notebook is worth 4% of your grade. Each lab quiz is worth 1.33% of your grade (total of 12%).

Scale: **A** 100-93; **A-** 92-89; **B+** 88-85; **B** 84-81; **B-** 80-77; **C+** 76-73; **C** 72-69; **C-** 68-65; **D** 64-57; **F** <56.

Laboratory Quizzes (Pre-lab Quizzes):

Before the start of each new experiment a 15-minute pre-lab quiz will be given to encourage and insure students have prepared for lab. Quizzes will be given during the first 15 minutes of lab. It is essential that you be on time for lab because make-ups will not be given. The instructor will let you know several days/week in advance as to when the quiz will be given.

ACADEMIC INTEGRITY: All students in this course are expected to have read and to abide by the demanding standard of personal honesty, drafted by the College of Arts & Sciences, which can be viewed at:

http://www.luc.edu/media/lucedu/cas/pdfs/academicintegrity.pdf

Anything you submit that is incorporated as part of your grade in this course (e.g., quiz, examination, homework, and discussion sheet) must represent your own work. Any students caught cheating will, at the very minimum, receive a grade of "zero" for the item that was submitted and this grade cannot be dropped. If the cheating occurred during a course exam, the incident will be reported to the Chemistry Department Chair and the Office of the CAS Dean. Depending on the seriousness of the incident, additional sanctions may be imposed.

Appropriate In Class Behavior and use of Electronic Devices

Rude, disruptive behavior (such as viewing computer materials not concerning class subjects, texting or talking on phones...) will not be tolerated. Voice recording but not visual recording is allowed for pre-lab lectures. Cell phones, pagers, wireless PDAs, etc. must be turned off during lab. If your device is activated during lab, you must leave the lab immediately and cannot return for the duration of that lab period.