Syllabus for Chem 212, Quantitative Analysis
Fall Semester 2014

Quantitative Analysis, 3 credit hours; 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.

Textbook: "Exploring Chemical Analysis" (5th edition), by Daniel C. Harris, ISBN 1-4292-7503-3. The Sapling learning online homework system is bundled with the textbook (print and etext).

Other Materials: You will need an inexpensive calculator having logarithmic (base 10 and base e), exponential, and trigonometric functions. Be sure you are familiar with your calculator and that it is in user-ready condition for quizzes and exams. **Calculators cannot be shared during exams and the covers must be removed while taking the exam.**

Objectives

1) To teach fundamental aspects of acid/base chemistry, electrochemistry, ionic equilibria.
2) To acquaint the student with some of the fundamental techniques and state-of-the-art applications of chemical quantitative analysis used in biomedical, forensic, and environmental chemistry.

Grading: The total grade for the course is based on five 1-hour exams given over the course of the semester, discussions, online homework, and one final. The lowest 1-hour exam score will be dropped. If you have to miss an exam due to illness or some other reason, this will be your dropped grade. If you miss another exam, then you must have a valid excuse (doctor's note) to have a make-up exam arranged. Each of the five hour exams is worth 17 % of your grade (best four is 68% of total). The final is worth 20% of your total grade. Online Homework and Discussion are 6% of your grade each.

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.

Homework: There will be six online homework assignments due the day of the exam. These assignments consist of 9-10 questions that are typically one-step problems. They will require 60-90 minutes to complete. If you get a question wrong, you can do it again. You are penalized 5% credit each time you have to redo a problem. Therefore if have to redo each question once, you will get a 95 on that assignment. A few of these questions may be multiple-choice, in these cases you may lose 20% or 33% credit for a redo depending on how many options there are. Students are expected to do the problems in the back of the chapters in the textbook and study the class notes as well. If you are good about this, you will do well on the exams.

Discussion Sections: Discussion sections meet once a week and will be held on Fridays from 1:40 PM to 2:30 PM in and from 2:45 PM to 3:30 PM in Flanner 105. A discussion

worksheet will be provided at the beginning of the period. The instructor will demonstrate the first problem or a selected problem on the worksheet for the class. Then you will be expected to complete the worksheet problems (you may work together) and hand them in at the end of the session. These will not be graded. If you turn in the assignment at the end of the discussion and you have made a good faith attempt to complete the whole problem set, you will get full credit.

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 talking during class, viewing computer materials not concerning class subjects, texting or talking on phones...) will not be tolerated. It is acceptable to use laptops or comparable devices (tablets, iPads, etc.) for taking notes in class. Voice recording but not visual recording is allowed. Cell phones, pagers, wireless PDAs, etc. must be turned off during class. If your device is activated during class, you must leave the class immediately and cannot return for the duration of that class period.

TENTATIVE CLASS SCHEDULE

Date	Day	Topic	Chapter
Aug 25	Monday	Introduction	3
Aug 27	Wednesday	Stoichiometry Review	3
Aug 29	Friday	Error and Statistics	4
Sept 1	Monday	Labor Day, No Class	
Sept 3	Wednesday	Sampling	4
Sept 5	Friday	Statistics	4
Sept 5	Friday	Discussion 1: Stoichiometry Review	

Sept 8	Monday	Stat. Analysis of Data	4
Sept 10	Wednesday	Stat. Analysis of Data	4
Sept 12	Friday	Exam 1 Statistics	3-4
Sept 15	Monday	Acids and Bases	8
Sept 17	Wednesday	Acids and Bases	8
Sept 19	Friday	Acid and Bases	8
Sept 19	Friday	Discussion 2: Acids and Bases	
Sept 22	Monday	Buffers	9
Sept 24	Wednesday	Acid/Base characteristics of Metals	8,9
Sept 26	Friday	Exam 2 Acids and Bases	8,9
Sept 29	Monday	Polyprotic acids	10,11
Oct 1	Wednesday	Titrations	10,11
Oct 3	Friday	Exam 3 Polyprotic Acids	10,11
Oct 6	Monday	Midterm break; no class	
Oct 8	Wednesday	Chelation	12
Oct 10	Friday	Complex Equilibrium	12,13
Oct 10	Friday	Discussion 3: Complex equilibrium	
Oct 13	Monday	Complex Equilibrium and EDTA	12,13
Oct 15	Wednesday	EDTA	13
Oct 17	Friday	Exam 4; Complex Equilibria, EDTA	12,13
Oct 20	Monday	Electrochemistry	14
Oct 22	Wednesday	Electrochemistry	14
Oct 24	Friday	Electrochemistry	14
Oct 24	Friday	Discussion IV: Electrochemistry	
Oct 27	Monday	Reference Electrodes	15

Oct 29	Wednesday	Potentiometry	15
Oct 31	Friday	Test 5: Electrochemistry	14,15
Oct 31	Friday	Last day to drop with grade of W	
Nov 3	Monday	Electromagnetic Spectrum	18
Nov 5	Wednesday	Absorption Spectrometry	18
Nov 7	Friday	IR and UV/Vis spec	18
Nov 7	Friday	Discussion V: Beer's Law	
Nov 10	Monday	Emission Spectroscopy	19
Nov 12	Wednesday	Instrumentation	19
Nov 14	Friday	Instrumentation	19
Nov 14	Friday	Discussion VI: Spectroscopy	
Nov 17	Monday	Quantification by Standard Additions	19
Nov 19	Wednesday	Immunoassays .	19
Nov 21	Friday	Chromatography .	21
Nov 21	Friday	Discussion VII: Immunoassay and Chromatography Calculations	
Nov 2	Monday	Mass Spectrometry	21
Nov 26, 28	Wednesday– Friday	Thanksgiving Break	
Dec 1	Monday	GC/MS	21
Dec 3	Wednesday	LC/MS	22
Dec 5	Friday	Review for Final	
Dec 5	Friday	Discussion VIII: Mass Spectrometry	
Dec 8	Monday	Final Exam 1:00 – 3:00 PM	