

Syllabus for Chem 212, Quantitative Analysis Fall Semester 2016

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 18% of your total grade. Online Homework is 6% of your final grade and Discussion 8% 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 assigned 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 8:15 to 9:05 AM in Dumbach 233. 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. The discussion key will be posted online on Sakai afterward so you can check your understanding.

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
Jan 18	Tuesday	Introduction/Stoichiometry Review	3
Jan 20	Thursday	Error and Statistics	3,4
Jan 21	Friday	Discussion I: Stoichiometry Review	
Jan 27	Tuesday	Sampling and Statistical Analysis of Data	4

Jan 29	Thursday	Statistical Analysis of Data	4
Jan 30	Friday	Discussion II: Statistical Analysis of Data	
Feb 2	Tuesday	Exam 1: Chapters 3 and 4	
Feb 4	Thursday	Acids and Bases	8
Feb 9	Tuesday	Acids and Bases	8,9
Feb 11	Thursday	Buffers	9
Feb 12	Friday	Discussion III: Acids and Bases	3-4
Feb 16	Tuesday	Exam II: Chapters 8 and 9	
Feb 18	Thursday	Titrations	10
Feb 19	Friday	Discussion IV: Titrations	
Feb 23	Tuesday	Titrations, polyprotic acids	10,11
Feb 25	Thursday	Polyprotic acids	11
Feb 26	Friday	Discussion V: Polyprotic acids	11
March 1	Tuesday	Exam III: Chapters 10 and 11	
March 3	Thursday	Chelation and Complex equilibrium	12
March 7-12	Spring Break		
March 15	Tuesday	Complex Equilibrium and EDTA titrations	12,13
March 17	Thursday	EDTA analysis of Metal ion mixtures	13
March 18	Friday	Discussion VI: Complex Equilibrium	
March 22	Tuesday	Exam IV: Chapters 12 and 13	
March 24	Thursday	Electrochemistry	14
March 29	Tuesday	Nernst Equation, Electrodes	14,15
March 31	Thursday	Potentiometry	15
April 1	Friday	Discussion VII: Potentiometry	15

April 5	Tuesday	Exam 5: Chapters 14 and 15	
April 7	Thursday	Electromagnetic Spectrum	18
April 12	Tuesday	Beer's Law, IR and UV spectrophotometry	18,19
April 14	Thursday	Emission Spectroscopy	19
April 15	Friday	Discussion VIII: Beer's Law	
April 19	Tuesday	Chromatography	21
April 21	Thursday	GC-FID and ECD	21
April 22	Friday	Discussion IX: Quantification by Standard Addition	
April 26	Tuesday	Mass Spectrometry	21,22
April 28	Thursday	Mass Spectrometry	21,22
April 29	Friday	Discussion X: Mass Spectrometry	
May 7	Saturday	Final Exam 9-11 AM	