

Syllabus for Chem 212, Quantitative Analysis Spring 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/Wednesday/Thursday 9:30 to 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 12:35 to 1:25 PM and 1:40 to 2:30 PM in Flanner 07. 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.

Dropping Class and Continuing in Lab

Students wanting to drop Chem 212 after midterm may stay in the co-req Chem 214 only if midterm grade, posted in LOCUS, is a D or better. Students should continue to attend lecture until the week of the drop date to gain as much background knowledge as possible. For Fall 2016 students wishing to drop lecture, and have a mid-term grade of D or better, can seek assistance from the Department of Chemistry and Biochemistry office beginning Monday 10/31 at 9:00am through Friday 11/4 at 4:00pm. Students with a midterm grade of F must drop the co-req lab along with the lecture. No exceptions.

TENTATIVE CLASS SCHEDULE

Date	Day	Topic	Chapter
Aug 30	Tuesday	Introduction/Stoichiometry Review	3
Sept 1	Thursday	Error and Statistics	3,4
Sept 6	Tuesday	Sampling and Statistical Analysis of Data	4
Sept 8	Thursday	Statistical Analysis of Data	4
Sept 9	Friday	Discussion I: Statistical Analysis of Data	
Sept 13	Tuesday	Exam 1: Chapters 3 and 4	
Sept 15	Thursday	Acids and Bases	8
Sept 20	Tuesday	Acids and Bases	8,9
Sept 22	Thursday	Buffers	9
Sept 23	Friday	Discussion II: Acids and Bases	3-4
Sept 27	Tuesday	Exam II: Chapters 8 and 9	
Sept 29	Thursday	Titrations	10
Sept 30	Friday	Discussion III: Titrations	
Oct 4	Tuesday	Titrations, polyprotic acids	10,11
Oct 6	Thursday	Polyprotic acids	11
Oct 7	Friday	Discussion IV: Polyprotic acids	11
Oct 11	Tuesday	Mid-Term Break	
Oct 13	Thursday	Exam III: Chapters 10 and 11	
Oct 18	Tuesday	Chelation and Complex equilibrium	12
Oct 20	Thursday	Complex Equilibrium and EDTA titrations	12,13
Oct 21	Friday	Discussion V: Complex Equilibrium	
Oct 25	Tuesday	EDTA analysis of Metal ion mixtures	13

Oct 27	Thursday	EDTA analysis of Metal ion mixtures	13
Nov 1	Tuesday	Exam IV: Chapters 12 and 13	
Nov 3	Thursday	Electrochemistry	14
Nov 8	Tuesday	Nernst Equation, Electrodes	14,15
Nov 10	Thursday	Potentiometry	15
Nov 11	Friday	Discussion VI: Potentiometry	15
Nov 15	Tuesday	Exam 5: Chapters 14 and 15	
Nov 17	Thursday	Electromagnetic Spectrum	18
Nov 18	Friday	Discussion VII: Beer's Law	
Nov 22	Tuesday	Beer's Law, IR and UV Spectrophotometry	18,19
Nov 24	Thursday	No class Thanksgiving	
Nov 29	Tuesday	Emission Spectroscopy	19
Dec 1	Thursday	Chromatography	21
Dec 2	Friday	Discussion VIII: Quantification by Standard Addition	
Dec 6	Tuesday	Mass Spectrometry	21,22
Dec 8	Thursday	Mass Spectrometry	21,22
Dec 9	Friday	Discussion IX: Mass Spectrometry	
Dec 16	Friday	Final Exam 1-3 PM	