

CHEMISTRY 240 - QUANTITATIVE ANALYSIS

Southern Connecticut State University

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Fall Semester 2006

Text: *Quantitative Chemical Analysis*, 7th Ed., Daniel C. Harris, W. H. Freeman & Co., 2006;
Quantitative Analysis Laboratory Manual, G. Kowalczyk, 2004.

Course Overview: CHE 240 is a course that teaches the students quantitative methods of analysis with the emphasis on “wet chemistry” including gravimetric and volumetric methods of analysis. The course also introduces the students to colorimetric methods of analysis with one experiment using the Spec 20. The course teaches the students these analytical laboratory techniques as well as use of the analytical balance, proper pipeting, filtration, decanting and titrating.

The course emphasizes analytical thinking and problem solving. The lab requires the students to plan their work prior to their arrival and expects students to perform stoichiometric calculations for their procedures. Solutions that are necessary for the experiment must be prepared from scratch by each student which means that the calculations must also be worked out individually. Students waiting to do these calculations when they get to lab will lose lab time that could be used for the experimental procedures. In order to pass the course, **a passing grade in lab of 60% must be attained.**

The laboratory and lecture portions of the course are complimentary as laboratory experiments involve specific topics and techniques covered in lecture. The lecture portion of the course emphasizes equilibrium chemistry and its application to quantitative analysis. Calculations required for the laboratory experiments are part of the theory presented in lecture.

Final Course Evaluation:

Best Two of Three Hour Exams	200 Points
Homework	100 Points
Laboratory	500 Points
Cumulative Final	<u>200 Points</u>
Total	1000 Points

There will be three graded homework assignments throughout the semester. Homework is due at the beginning of the class period on the due date specified on each assignment.

COURSE SCHEDULE

Weeks 1-4 Chapters 6, 9, 8, 27	Solutions, Chemical Equilibrium, Gravimetric Analysis Solubility Product Activity Coefficients Precipitation Processes, Methods Contamination Mechanisms
Week 5-9 Chapters 7, 10, 11, 12	Acid – Base Chemistry Equilibrium Constants and Calculations Derivation of α -values and graphs Polyprotic Systems Titration Curves Indicator Selection Endpoint Errors
Week 10 Chapter 18	Spectroscopic Analysis Absorption of Light Measuring Absorbance – Spec 20 Operations Beer's Law
Week 11 – 12 Chapter 13	Complexometric Chemistry Complexing Agents - EDTA α -values as a function of pH pM calculations along a titration curve
Week 13-14 Chapters 14, 16	Oxidation – Reduction Chemistry Nernst Equation E_{sys} along a titration curve Assumptions in the Nernst Equation Selection of Indicators
Week 16	Final Exam

Within this course schedule, we will need to plan the three hour exams. I'm flexible (within reason) of the dates so that all of your exams don't occur on the same day. The first exam will cover gravimetric analysis, the second will cover acid-base titrations and the third will cover colorimetry and complexometric titrations. The expected times of these exams will be weeks 6, 11 and 14, respectively.

Late/Missed Work: Due to the fact that the lowest exam grade is dropped, generally, there will be no make-up examinations. In the event of illness or other catastrophic events, written evidence (doctor's note, etc.) must be supplied. The professor **MUST** be

notified before the scheduled exam if a make-up is to be considered. There will be no lectures on exam days. There are no make-ups for missed labs under any conditions.

Attendance: Regular and prompt attendance of scheduled lectures is expected. Some of the material covered in lecture will be additional to what is covered in the text book. There are no make-up days for missed lab sessions. The allotted time for laboratory work is 1:10 - 5:00 pm Tuesday and Thursday only. Under no condition will lab work outside these times be permitted. There will be six experiments that must be completed. Any experiments not completed will earn a grade of zero.

Course Withdrawal: If you decide to withdraw from this course and wish to take it again, be aware that you will be placed behind those who have not yet taken this course. There is a limit of eleven students for this course and those who have not yet taken the course get first priority. You will be placed on a waiting list and unless an opening occurs or a second section is opened, you may have to wait an additional semester to repeat the course.

Inclement Weather: When inclement weather threatens, call the university's WeatherChek voice mail message line (203-392-SNOW) to hear the latest official information on possible delayed openings, class cancellations, or the closing of the university. Also, I will post the closing on my web page as soon as I receive word. In the event that an exam is scheduled on a day that is canceled, the exam will be given at the next class meeting. Consult the web page for exam updates and changes.

Some Final Thoughts: Unfortunately, the question of academic honesty occasionally becomes an issue between an instructor and a student. The best way to avoid this is to be sure that no suspicions arise. **Cheating on exams or any phase of this course will not be tolerated. The student handbook outlines the various prerogatives of the instructor in cases of academic dishonesty.**