Chem 213
Quantitative Analysis
Fall, 2006

Course Objectives -

In this course, the student will:

- Learn to develop procedures for making quantitative chemical measurements
- Get hands-on experience in making quantitative chemical measurements
- Improve their problem-solving skills

Topics that will be emphasized in the course include:

- Chemical equilibrium in aqueous solutions
- Statistical methods for the treatment of data
- Interpretation and presentation of experimental results (Lab)

Instructor -

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Office Hours: Mon. & Wed., 11 am; Tuesday 1:30 pm, and by appointment

Lecture and Lab -

MW	10-10:50 am	P413	Section A0A	
MW	1:00-3:50 pm	P407	Section A01	(Lab)
TR	9:00-11:50 am	P407	Section A02	(Lab)

Text: Daniel C. Harris, Quantitative Chemical Analysis, 6th Ed., W.H. Freeman, 2003.
Web site: http://www.chem.uwec.edu/Chem213_F06/
Final Exam date: 10:00 AM, Monday, Dec. 18, 2006

Attendance

The university requests that class attendance be monitored. Although attendance will not be directly used to determine your class grade, you are expected to attend all course lectures and labs. You will *not* be allowed to make up missed lab sessions.

Excused Assignments

All materials to be graded for this class have a deadline (exams, lab reports, and possibly homework sets). If for some reason you need an extension for an assignment or exam, you **must** talk to me ***before*** the assignment is due. Missed assignments will not be excused.

First-Day Attendance Policy

The Chemistry department's first-day attendance policy specifies that if the course is full and people are on a waiting list, those enrolled students who miss the first day may be dropped from the class rolls.

Students with Disabilities

Any student who has a disability and is in need of classroom accommodations is advised to contact the instructor and the Office of Services to Students with Disabilities. For example, red/green color blindness will make lab more difficult.

Comments on Lecture

Students are expected to come to class prepared to discuss the assigned reading and to solve problems. Notebooks, pens/pencils, and calculators should be brought to class. The textbook will also be used from time to time during class.

A spreadsheet program (Excel or other) will be needed for several laboratory problems/calculations. Excel is available on the PCs in the open computer labs around campus. You are free to use any spreadsheet program you wish. Some instruction for Excel will be provided during lab; free workshops for a variety of programs (including Excel) are available from an ICSS (Initiative in Curricular Software and Support) program called BITS (Bringing Instruction in Technology to Students). Ask the instructor for a BITS schedule or contact ICSS.

Comments on Study Outside Lecture

In general, you should expect to spend at least 2 hours outside of lecture for every hour spent in lecture, working on course material. For the lab, about 1 hour outside of lab will be needed for each (3 hour) period. In total, you should expect to spend about **six hours outside** of the lecture or lab working on course material.

Important Dates

Last day to Drop with No Record (no "W") & Full Refund:	Sept. 18
Last day to Drop with a "W"	Nov. 13

Academic Misconduct

Throughout this course you will be encouraged to work in groups. Nonetheless, it is expected that the work you submit to be graded will be work completed by you *alone*. (Note – working alone and then comparing your answers with others at the end is **not** working alone.) Submitting someone else's work for a grade, or changing a completed exam and submitting for a re-grade are examples of academic misconduct. Maximum penalties will be sought in demonstrable cases.

Lab -

Lab Notebooks

- ◊ Lab Manuals are NOT allowed in lab. All information that you will need is to be in your *lab notebook* ahead of time.

- ◊ Notebook format

  It will help you to prepare tables for the data that you need to collect, as a reminder to you what you need to measure.

  Your lab notebook is to be the only "document" in the lab - everything you need must be written here. Keep your notebook with you when taking data. DON'T record your data somewhere else (like on a paper towel) and then transfer it.

Grades -

Exams -

There will be three hour exams and a comprehensive final exam. A breakdown of grade points is shown below, *although homework and lab points are approximate*:

Homework -

Problems will be assigned on a sporadic basis and may be graded. Homework assignments are to be turned in *at the start of class* on the assigned day. Homework turned in at the end of class is late, and will be marked down 25%.

Late Penalties -

Work that is turned in up to 24 hours late will lose 25% of the available points. Work that is late more than 24 hours and less than 48 hours will lose 50% of the points, etc.

3 Exams @ 100 pts each	300 pts
Final Exam	150 pts
Lab Grade	300 pts
Homework	100 pts
Total Points	850 pts

Grades will be set by the following scale:

85% to 100%	A, A-
72% to 85%	B, B+, B-
60% to 72 %	C, C+, C-
50% to 60%	D
Below 50%	F

Book Chapters and Exam Schedule **-**

	Chapter Lecture	Lab
1. The Analytical Method	0	
2. Chemical Measurements / Tools of the Trade	1	2
3. Chemical Equilibrium / Calibration Methods	6	5
EXAM #1 – Oct. 4, 2006		
4. Titrations / Experimental Error	7	3
5. Monoprotic Acids and Bases / Statistics	10	4
6. Acid-Base Titrations	12	
EXAM #2 – Nov. 1, 2006		
7. Spectrophotometry / Electrochemistry	18	14
8. Introduction to Separations / Potentiometry	23	15
9. GC, HPLC	24,25	
EXAM #3 – Dec. 6, 2006		

Reading Assignments -

Ch 0 All sections
Ch 1 All sections
Ch 2 All sections - Do the Excel exercises !
Ch 6 6.1 - 6.5 (See Ch. 10 for later sections)
Ch 5 Intro parts, 5.2-5.4, 5.1 with less emphasis

Ch 7 7.1 - 7.4
Ch 3 All sections
Ch 4 4.1-4.3, 4.6
Ch 10 6.7-6.9, 10.1-10.4, parts of 10.5 (pp. 189 thru 194; stop at “Buffer Capacity”.)
Ch 12 12.1-12.6

Ch 14 14.1-14.6
Ch 15 15.1-15.5, parts of 15.6 (pp. 330 thru 33; stop at “Liquid-Based Ion-Selective Electrodes”)
Ch 18 All sections
Ch 23 All sections
Ch 24 24.1, 24.2, parts of 24.3 (pp 593-596,“Gas Chromatography/Mass Spectrometry” section)
Ch 25 25.1, 25.4

Experiments –

Pipet Lab: 1 day, along with check-in and safety.

Grav Ca: 2 days is enough if the crucibles work. After day 2, its only drying samples. Schedule computer lab for Excel worksheets. They will need at least 2 L of "other" water sample for water hardness.

Water Hardness: 3 days are needed, because of time lost to intro discussion (1 hr) and time lost in computer lab for Excel. They will need to get a juice sample for Vit. C. They need to do 12 titrations for their data and another 6 titrations for the blank.

Vit. C: This lab can easily be done in 2 days. There are 9 titrations, no blank titrations. Solution prep is relatively quick – they should be able to prepare solutions and standardize on the same day. Vit C tablets and juice samples are run the second day. 1 hr. prelab.

Vol ASA: Two days is enough for the experiment. Designate Excel time (to learn graphing and to learn derivative plots) during the Spec ASA lab. So, only two days here. Note that time is lost to discuss Manager/Technician and the experiment. Clarification of the pH titration here would be helpful.

Spec ASA: Part of one day is lost to Excel for Vol ASA; more time lost to Spectroscopy discussion. The experiment itself will take two full days. So, three days here, which will allow for overflow from those who did not finish Vol ASA in two days.

Antacids lab: Minimal discussion/prelab. Time will be needed for Excel, to learn fitting data and getting errors in data. Is two days enough for all of this?

F ISE: Data fit in Excel, but no Excel lab needed. Propogation of error on this one is probably not a good idea. Two days should be enough, especially with groups of two.

HPLC: Probably need three lab days, just to get everyone through the experiment. Since large groups are working here, make them all choose the same sample. Then, as a group, they will have enough statistics on one sample to generate a report, including error analysis. Label values for coffee and tea are variable; label values for soft drinks are not (as long as they aren't "fountain" drinks). Use the data to calculate some separation statistics as a homework set. They need to be choosing a final project now and submitting a proposal.

Ca AAS: Three days here are needed too – it takes at least one full day to figure out the solutions to prepare, since we don't really provide them with a procedure. Also, there is a prelab, and a video tape. More than one day is lost before actual experiments begin.

Final Projects: 3 days is the minimum. 4 days would be better. Whether they work at all during that time is up to them.

Total – 26 lab days miniumum. 27 lab days is preferred. In a 15 week semester, there are about 28 lab days.