Chemistry 5161 "Analytical Spectroscopy" Fall 2008

Class Time: Tue, Thu 10:45–12am
Class Room: Ekeley W166

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Tue 12-1, Thu 12-1 (please email me in advance)

Exams:	In class Tuesday, Sept 25; and Thursday, Oct 30 (bring a calculator)
Final Exam:	Thursday, Dec 11 from 9:30am – 12pm (bring a calculator)
Presentations:	You will write a paper discussing an optical spectroscopic measurement technique that is new to you (has not been discussed in class). In a 15min oral presentation (using powerpoint or similar) you will present the topic to the class.
Problem sets:	ungraded sets of homework problems will be given throughout the semester.
Prerequisites:	graduate standing, basic knowledge of quantum mechanics and instrumental analysis.

Course Goals:

The course provides an introduction to optical spectroscopy from an experimentalist's perspective. The major focus is on instrumentation, i.e., light sources, dispersive elements, detectors available for building instruments that measure light in the ultraviolet, visible and infrared spectral ranges for use in spectrochemical analysis. Special topics include spectral databases of line parameters, atomic and molecular absorption and emission spectroscopy, molecular luminenscence and Raman spectrometry, laser analytical methods, and applications to environmental, atmospheric, and bio-analytical problems.

This course does NOT cover mass-spectrometry and chromatography (CHEM-5181), NMR (CHEM-5331), special surface techniques (CHEM-5571), intro quantum mechanics (CHEM-5581), and spectra interpretation from quantum theory (CHEM-5591) as specialized courses do cover those topics.

Texts: There is no single text that adequately covers the material relevant to this course. Some useful books are:
P.F. Bernath, "Spectra of Atoms and Molecules", 2nd edition
J.M. Hollas, "Modern Spectroscopy", 4th edition
Skoog, Holler, Crouch, "Principles of Instrumental Analysis", any edition

Bernath quantitatively relates quantum mechanics to macroscopic observables like line intensities and lineshapes and is a very useful resource. The mathematical treatment of material is rigorous, and may confuse if not followed from the beginning. Hollas comes closest to a textbook; individual chapters can be followed even if read separately from the context of previous chapters. However, the mathematical treatment is not rigorous, and Bernath is preferred if quantitative information is to be derived. Relevant reading material and announcements will be made available for download from the course website: http://www.colorado.edu/chemistry/volkamer/teaching

Grading: the final grade will be the higher of the two grades calculated as follows:

	Method 1	Method 2
two exams:	20% (best exam)	30% (15% each)
final exam:	40%	30%
paper:	15%	15%
presentation:	15%	15%
other:	10%	10%

Problem sets: Problems should be done on your own, but you can discuss them. The questions will resemble those posed in exams.

Exams, paper: By signing your name on these graded assignments you are agreeing to the CU Honor Code Pledge http://www.colorado.edu/academics/honorcode/pledge.htm

I encourage students with a disability to contact me in the first two weeks regarding appropriate accommodations.