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Office Hours: Whenever I’m not busy – just stop by. Feel free to contact me by phone or e-mail. I check my e-mail regularly.

Course Overview: Chemistry 512 is a graduate level course in instrumental methods of analytical chemistry, covering both spectroscopic and separation methods. Electroanalytical methods are covered in Chemistry 511.

Recommended Text: Principles of Instrumental Analysis by Skoog, Holler and Nieman 5th/ed. While not the ideal text for this class, it is adequate in that it covers a range of topics in both spectroscopy and separations. I will provide handouts which will summarize the pertinent information from the book, but note that there will be lots of information that you will not find in the book since I have added information appropriate for a graduate level course.

Course Grade: Your final grade in CHM 512 will be determined by your performance on 2 in term exams, one final exam and several homework assignments. The distribution is as follows.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tr>
<td>2 hour exams</td>
<td>50%</td>
</tr>
<tr>
<td>1 final exam</td>
<td>35%</td>
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<tr>
<td>Homework sets</td>
<td>15%</td>
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Tentative Exam Dates:

Tentative Topics:

9. Fundamentals of spectroscopy (light sources, optical components, optical phenomena – absorption, reflection, refraction, etc.)

10. Atomic spectroscopy (A.A.S., A.E.S., ICP)

11. Molecular spectroscopy
   a. UV-Visible
   b. Infrared spectroscopy (specular/diffuse reflection, grazing angle, ATR)
   c. Raman spectroscopy (resonance raman, SERS)
   d. Fluorescence spectroscopy (steady-state, lifetime, FRET, anisotropy)
12. Introduction to Laser (Non-Linear) Spectroscopy (depending on time)
   a. Second Harmonic Generation (SHG) and Third Harmonic Generation (THG)
   b. Sum Frequency Generation (SFG)

13. Introduction to surface spectroscopy/microscopy (as time permits, these topics are meant to familiarize you with the methods employed in the fast growing field of nano/surface science)
   a. XPS/ESCA (X-ray photoelectron spectroscopy)
   b. AFM, STM, SEM (atomic force, scanning tunneling, scanning electron microscopy)
   c. SIMS (secondary ion mass spec)
   d. Ellipsometry/SPR (surface plasmon resonance)

14. Separation Methods
   a. Fundamentals of separation science (resolution, retention time, capacity factor, columns, support, etc.)
   b. HPLC (normal-phase vs. reversed-phase)
   c. GC
   d. CE/CEC

Tentative Exam Dates:

Exam 1:
Exam 2:
Final Exam: