Syllabus
Chemistry 530
Spectrochemical Methods
Fall 2005

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   d) Primary Text: Spectrochemical Analysis, Ingle and Crouch

2) Optical Elements (Chapters 1-3)
   a) Rays
   b) Refractive Elements
      i) Snell's law of refraction
      ii) Polarization and reflection
      iii) Total reflection and critical angle and light pipes and attenuated total reflection
      iv) Reflection Intensity
      v) Brewster's angle and Brewster-angle widows
      vi) Lenses
      vii) Mirrors
      viii) Interference and Diffraction
         (1) Young's Experiment
         (2) Diffraction Gratings
         (3) Grating Dispersion
         (4) Diffraction from a single slit and impact on resolution

3) Sources (Chapter 4)
   a) Radiance
   b) Types of sources
      i) Blackbody
      ii) Line
      iii) Lasers

4) Ebert monochromator systems
   a) Definition
   b) Source coupling
   c) Dispersion
   d) Slit function
   e) Photomultipliers
   f) Computation of signal to noise ratio and effect of background radiation
   g) Computation of throughput
   h) Detector coupling
   i) Computation of signal to noise ratio for real signals with background

5) Collecting all the signal all the time and increases in S/N. Microchannel plates, charge coupled devices, image intensifiers etc.
6) Analog detectors: photodiodes, thermocouples, photovoltaic etc.
7) Raman spectrometers and Raman Spectrometry.
8) Infrared spectrometers and infrared spectroscopy.
9) Visible and UV spectrometers and visible and UV spectrometry.
10) Atomic Absorption Spectrometers and atomic absorption spectroscopy.
11) Fluorescence spectrometers and fluorescence spectroscopy: liquid, solid and gas phase.
12) Photo fragmentation laser induced spectroscopy.
13) Chemiluminescence sensors and applications.