CHEM753 Chemical Instrumentation

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This course involves hands-on training in the use of various departmental analytical instruments. Each class (one instrument or computer topic is covered per class) will consist of an approximately 2-3 hour lecture/demonstration on proper use of that instrument. A basic knowledge of instrument design and experimental methodology is assumed (see the section on suggested reading below). This course is ideal for the student desiring hands-on instrument training. After the initial training session is completed each student will be assigned a project involving the analysis of one or more samples using that instrument. The student may have access to that instrument on an individual basis for the duration of the term.

Each student may sign up for *up to three* instrument and/or computer/software lecture topics per term. At the end of the term each student must turn in a laboratory report for each instrument on which they have been trained consisting of a brief statement of the analytical problem and a full analysis of the independently collected data (spectra or chromatograms, as appropriate). Requirements for each of the instruments will be distributed separately.

Students should sign up for three credits/term. This course may be repeated.

Required prerequisite: an undergraduate instrumental analysis course.
Suggested co-requisites: graduate level spectroscopic, chromatographic, or mass spectrometry methods course.

Instrumentation

Perkin-Elmer Spectrum One Fourier-Transform Infrared Absorption Spectrometer w/Universal Diamond Attenuated Total Reflectance (ATR) accessory

Perkin-Elmer LS-55 Spectrophotofluorimeter

Perkin-Elmer Lambda-950 UV/visible/Near-IR Absorption w/60mm diffuse reflectance sphere

Perkin-Elmer Lambda-35 UV/visible Absorption Spectrometer

Varian AA240FS Atomic Absorption Spectrometer

Perkin-Elmer model 343 Polarimeter

Perkin-Elmer Clarus 500 capillary-column Gas Chromatograph

Perkin-Elmer Clarus 500 Gas Chromatogram-Mass Spectrometer System

Perkin-Elmer Series 200 Quaternary High Performance Liquid Chromatograph

Electronics workstation: including BK Precision 20MHz oscilloscope, Frequency Generator, Counter, miscellaneous portable electronic test equipment.

Computer/Software Training

Galactic Industries, Inc. GRAMS32 Program (general data analysis)

Basic Data Acquisition with a Windows-based Personal Computer using Data Translation Measurement Foundry

Suggested Reading:

It is highly suggested that you review the basics of each technique **prior** to attending the laboratory lecture/instrument demonstration. A short quiz may be given at the beginning of the training session to ensure that the students have reviewed the material and are prepared to learn how to operate the instrumentation. The chapters listed below refer to the instrumental analysis textbook used in the undergraduate analytical chemistry sequence. Note that any instrumental analysis textbook would give similar information, if another is available to you please feel free to use it.

Atomic absorption spectroscopy: chapter 9*
Basic electronics: chapters 2-5*
Coulometry: chapters 22, 24*
Fluorescence spectroscopy: chapter 15*
Gas chromatography: chapters 26-27*
High performance liquid chromatograpy: chapters 26, 28*
Infrared spectroscopy: chapter 16*, chapter 7I* (Fourier transform techniques)
Mass spectrometry: chapter 20*
Polarography: chapters 22, 25*
Potentiometry: chapters 22-23*
UV/visible spectroscopy: chapters 13-14*

*D.A. Skoog, F.J. Holler, T.A. Nieman, Principles of Instrumental Analysis, 5th ed., Philadelphia, PA: Saunders College Publishing, Inc., 1998.

WebCT:

We will be using WebCT (Drexel's on-line course tool package) to enhance communication in CHEM431. Note that the laboratory schedule (a list of what labs you will be doing what days) will *only* be distributed using the WebCT calendar. The instructions below tell you how to log on and begin using WebCT.

1) Login through DrexelOne at http://one.drexel.edu.
2) Enter your Drexel domain ID and password, click on **Login**.
3) Click on the **Student Services** Tab.
4) Click on the **My Courses** link.

or

1) Enter the Drexel WebCT Vista website directly at http://webct.drexel.edu.
2) Enter your Drexel domain ID and password, click on **OK**.

If you enter these correctly you will now be at your MyWebCT Home Page in the WebCT area. Select **CHEM753** from the list of courses in the middle of the screen.

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