CHEM753 Chemical Instrumentation

Instructor: Dr. Kevin Owens  
Office: Stratton 415  
Tel: 215-895-2621  Fax: 215-895-1265  
e-mail: kevin.owens@drexel.edu

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 independently collected supporting documentation (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: undergraduate Instrumental Analysis.  
Suggested co-requisites: graduate level spectroscopic, chromatographic, or mass spectrometry methods course.

Instrumentation

Hewlett-Packard GC-MS System, consisting of a model 5890A Gas Chromatograph and a 5970A Mass Selective Detector.

Perkin-Elmer Modular High Performance Liquid Chromatograph (consisting of model 250 binary gradient pump and model 235 UV diode array detector) or Waters Modular High Performance Liquid Chromatograph.


Photon Technology International M-III spectrophotofluorimeter

Perkin-Elmer model 330 UV/visible/near-IR spectrophotometer with diffuse reflectance integrating sphere

Perkin-Elmer Lambda-2 UV/visible absorption spectrometer

Varian Cary-219 UV/visible absorption spectrometer

Varian model 1275 Atomic Absorption Spectrometer with GFA-75 graphite furnace accessory
Hewlett Packard 5840A dual column packed-column gas chromatograph, with 5840A GC terminal.

EG&G Princeton Applied Research 174 Polarographic Analyzer, with EG&G PAR model 303A hanging mercury drop electrode.

Astra Scientific International Chronoamperostat CEAMD-6.

Homebuilt potentiometric endpoint monitor/auto-titration system.

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

**Computer/Software Training**

Basic Galactic Industries, Inc. GRAMS32

Advanced Galactic Industries, Inc. GRAMS32

Basic Data Acquisition with the PC (using Data Translation, Inc. hardware and software)

**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 chromatography: 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*

WebCT

We will be using WebCT (Drexel's on-line course tool package) to enhance communication in CHEM753. The instructions below tell you how to log on and begin using WebCT.

1) Enter the Drexel WebCT web site at http://webct.drexel.edu or through DrexelOne.
2) After logging in to WebCT, select CHEM753 from the list of courses on the left side of the screen.
3) You will now be in the CHEM753 course area. Select the Bulletins icon to read posted messages, the Calendar icon for the course schedule, etc.

Rev 9/25/04  kgo