CHEM3290E INSTRUMENTAL ANALYSIS

Course Description:

CHEM3290E provides a broad survey of instrumental methods of chemical analysis. The focus is on fundamental principles, instrumentation design, analysis techniques and operation along with practical hands-on applications in the labotatory.

Instructor:

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Textbook:

Undergraduate Instrumental Analysis James W. Robinson, Eileen M. Skelly Frame and George M.Rrame II, MARCEL DEKKER, 6th Edition, 2005

Recommended reading:

Principles of Instrumental analysis, Skoog, Holler and Nieman, Brooks/Cole Thomson Learning, 5th Edition, 1998

Exam Schedule and Grade Policies:

Exam 1	10%
Exam 2(final)	70%
Assignment	10%
Literature reviews	10%

Exams can only be missed for a good reason and with the consent of the instructor. A valid written excuse, such as a note from the doctor, will be required. *Only a single make-up exam will be given.*

Outline

Electroanalytical Chemistry

Potentionmetry

Coulometry

Conductonetric analysis

Polarography

Voltammetry

Chromatography

Principles of chromatography

Gas Chromatography

Chromatography with liquid mobile phases

Introduction to Spectroscopy

The Interaction Between Electromagnetic Radiation and Matter

Absorption Laws

Methods of Calibration

Atomic Absorption Spectrometry

Absorption of Radiant Energy by Atoms

Instrumentation

The Atomization Process

Interferences in AAS

Analytical Applications of AAS

Atomic Emission Spectrometry

Glow Discharge Emission Spectrometry

Plasma Emission Spectroscopy

Visible and Ultraviolet Molecular Spectroscopy

Introduction

Instrumentation

UV AbsorptionSpectra of Molecules

UV Spectra and the Structure of Organic Molecules

Analytical Applications of UV

Accuracy and precision in UV/VIS Absorption Spectrometry

Infrared Spectroscopy

Absorption of IR Radiation by Molecules

IR Instrumentation

Sampling Techniques

FTIR Microscopy

Nuclear Magnetic Resonance Spectroscopy

Introduction

The FTNMUR Experiment

Chemical Shifts

Spin-Spin Coupling

Instrumentation

Analytical Applications of NMR

Mass Spectroscopy

Principles of MS

Instrumentation

Interpetation of Mass spectra

Applications of molecular MS