4:112 Analytical Chemistry II
Spring 2009

Instructor: Professor M. Lei Geng

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Lectures: 10:30-11:20 am MWF, C125 PBB

Office Hours: 1:30-2:30 pm MWF or by appointment

Textbook: Skoog, Holler and Nieman, *Principles of Instrumental Analysis*, Brooks/Cole, Thomson Learning.

Course Objectives:

The objective of Analytical Chemistry II is to discuss instrumental methods for chemical analysis. Instrumental analysis is playing a crucial role in today's chemical and pharmaceutical industry, biomedicine, environmental and materials sciences. This course will introduce to the students technologies that utilize automated instrumentation to identify, quantify and separate chemical species. Optical spectroscopic, mass spectrometric and chemical separation methods will be covered in the course.

Grading:

Problem sets 250 points; Hour exams 300 points; Final exam 200 points.
Total points for the course: 750
Plus and minus grades will be assigned.

(1) Problem Sets: Five problem sets will be assigned during the semester. The problem sets will be based on lecture materials and the textbook. (50 points each)
(2) Hour exams: There will be three hour exams. (100 points each)
(3) Final exam: The final exam will have two components. The first component covers materials since hour exam 3 and the second is cumulative. (200 points)

Course Web Site:

All course materials are available on the 004:112 Icon site. Course syllabus, schedule, lecture notes, announcements, answer keys to assignments and exams, and grades are posted on this site.

Course Topics and Schedule

Dates	Lecture Topics / Assignments
Jan. 21	Introduction
Jan. 23	Introduction
Jan. 26	Introduction
Jan. 28	Principles of spectroscopy
Jan. 30	Principles of spectroscopy
Feb. 2	Principles of spectroscopy
Feb. 4	Components for chemical instrumentation: Physical and geometric optics
Feb. 6	Components for chemical instrumentation: Sources and Detectors
Feb. 9	Components for chemical instrumentation: Monochromators and polychromators
Feb. 11	Components for chemical instrumentation: Monochromators and polychromators
Feb. 11	**Problem Set 1 Due**
Feb. 13	Measurement basics: Signal and noise
Feb. 16	**Exam 1**
Feb. 18	Measurement basics: Electronics
Feb. 20	Measurement basics: Electronics
Feb. 23	Atomic spectroscopy: Introduction
Feb. 25	Atomic spectroscopy: Atomic absorption spectroscopy
Feb. 27	Atomic spectroscopy: Atomic absorption spectroscopy
Mar. 2	Atomic spectroscopy: Atomic emission and fluorescence spectroscopy
Mar. 4	Molecular spectroscopy: Introduction
Mar. 4	**Problem Set 2 Due**
Mar. 6	Molecular UV-visible spectroscopy
Mar. 9	**Exam 2**
Mar. 11	Molecular luminescence spectroscopy
Mar. 13	Molecular luminescence spectroscopy

Dates	Lecture Topics / Assignments
Mar. 16-20	**Spring break**
Mar. 23	Vibrational spectroscopy: Introduction
Mar. 25	Vibrational spectroscopy: Infrared spectroscopy
Mar. 27	Vibrational spectroscopy: Infrared spectroscopy
Mar. 27	**Problem Set 3 Due**
Mar. 30	Vibrational spectroscopy: Raman spectroscopy
Apr. 1	Mass spectrometry
Apr. 3	Mass spectrometry
Apr. 6	Mass spectrometry
Apr. 8	Mass spectrometry
Apr. 10	**Exam 3**
Apr. 13	Introduction to chemical separations
Apr. 13	**Problem Set 4 Due**
Apr. 15	Introduction to chemical separations
Apr. 17	Introduction to chemical separations
Apr. 20	Gas chromatography
Apr. 22	Gas chromatography
Apr. 24	High performance liquid chromatography
Apr. 27	High performance liquid chromatography
Apr. 29	High performance liquid chromatography
May 1	High performance liquid chromatography
May 1	**Problem Set 5 Due**
May 4	Capillary electrophoresis and electrochromatography
May 6	Capillary electrophoresis and electrochromatography
May 8	Surface characterization methods
May 12	**Final Exam (12:00 – 2:00 pm, C125 PBB)**