

**CHEMISTRY 470: ANALYTICAL CHEMISTRY OF POLLUTANTS and
CHEMISTRY 516: ENVIRONMENTAL CHEMISTRY**

SPRING 2007

Lecture THU/FRI 1:00-1:50, 115 Talbert
Laboratory To Be Arranged
Professor Dr. Diana S. Aga
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Office hours: WED/THU: 10-11 am or by appointment

This course will focus on the fundamentals of environmental sampling, sample preparation, and analysis using modern instrumental techniques. Topics will also include a discussion of the physico-chemical factors that affect the persistence and partitioning behavior of pollutants in soil and water. Students will learn how to select the most appropriate analytical tool for a particular environmental investigation based on knowledge of the chemical and physical properties of pollutants. The laboratory component of this course will provide the students hands-on experience on the analysis of persistent organic pollutants, pesticides, metals, and pharmaceutical contaminants in various environmental matrices. Students enrolled for graduate credits will be required to lead class discussions of selected journal articles from *Environmental Science and Technology*.

Main References:

- Environmental Analysis (Analytical Chemistry by Open Learning),
Author: Roger N. Reeve ; published by John Wiley and Sons
- Quantitative Chemical Analysis, 6th Edition, by Daniel Harris
- Principles of Instrumental Analysis, 5th edition, by D. Skoog, F.J. Holler, and T.A. Nieman
- Basic Concepts of Environmental Chemistry, by Des W. Connell
- Environmental Chemistry (7th Edition) by Stanley E. Manahan
- Environmental Organic Chemistry, (2nd or 3rd ed) by Rene P. Schwarzenbach, et al.

Grade Distribution:

Quizzes	20%
Assignments	10%
Mid-Term Exam	15%
Final Exam	15%
*Laboratory Reports [Due a week after completion of experiments]	20%
<u>Independent Project (Written Report and Oral Presentation)</u>	<u>20%</u>

[For graduate students]

*Journal article (to be assigned by professor) discussion in class 20%

NOTE: Topics for independent projects must be approved by professor by **February 19.**

Topics

- I. Physico-chemical Properties of Contaminants Affecting their Environmental Fate and Transport
- II. Fundamentals of Environmental Sampling and Analysis
 - Basic Concepts of Quantitative Analysis (Standard Curves, Standard Addition, Internal Standards, Quality Assurance, Quality Control)
 - Sample Handling and Preparation (ASE, SFE, SPE, Soxhlet, SPME)
 - Spectroscopic Analysis (UV-Vis Spectroscopy, Atomic Absorption Spectroscopy)
 - Chromatographic Analysis (HPLC, GC/MS, LC/MS, electrophoresis)
 - Field Portable Assays
- III. Processes in the Environment
 - Chemistry of natural waters and water pollution
 - Soil contamination
 - Atmospheric chemistry and pollution
 - Wastewater treatment
- IV. Environmental Toxicology and Analysis of Selected Contaminants
 - Persistent organic pollutants
 - Agricultural and pharmaceutical chemicals
 - Soaps and detergents
 - Heavy metals and organo-metallic compounds

Schedule

January 18, 20-	Lecture, No Lab
January 25, 26-	Lecture, LAB [2-3 pm]: Lecture on Statistical Analysis/ Limit of Detection
February 1, 2 -	Lecture, LAB [2-3 pm]: Lecture on Standard Addition/ Internal Standard
February 8, 9 -	Lecture, LAB: GC/MS analysis of polychlorinated biphenyls [Quantification, Identification, Mass Fragmentation]
February 15, 16 -	Lecture, LAB: Metal Analysis by Atomic Absorption Spectroscopy [Method of standard addition]
February 22, 23 -	Lecture, LAB: LC/MS Analysis [Qualitative Analysis by Ion-trap MS]
March 1 (no class- PittCon),	<u>March 2 (Mid-Term EXAM), NO LAB</u>
March 8-	No Lecture, LAB: Solid-phase Extraction [Use of Internal Standard]
March 9 -	<u>Attend seminar at 11 am:</u> Bryan Norton, Georgia Tech, “ <i>Sustainability and Adaptive Management</i> ” [Assignment: Report on the seminar via Email]
March 15, 16 -	SPRING BREAK
March 22, 23 -	Lecture (GS discuss journal article), LAB: Independent Project
March 29, 30 -	Lecture, LAB: Independent Project
April 5, 6 -	Lecture, LAB: Independent Project
April 12, 13 -	Graduate Students Independent Project Presentations, LAB: Ind. Project
April 19, 20	Graduate Students Independent Project Presentations, LAB: Ind. Project
April 26, 27 -	Undergraduate Students Independent Project Presentations
May 4	ALL PAPERS MUST BE SUBMITTED

May (TBA)

FINAL EXAM