

Analytical Methods for Use in the Environment

Instructor:

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Text: *Introduction to Environmental Analysis*, 1st Edition, **R. Reeve**, John Wiley & Sons, Ltd Publishers, 2002 (RR)

Optional: *Environmental Analytical Chemistry*, 2nd Edition, **F.W. Fifield and P.J. Haines**, Blackwell Science, 2000 (FH)

Lab Manual: Available from Instructor.

Time and Location: 14:15 - 16:05 **Friday**

Evaluation:

Assignments **10%**

Lab Reports **30%**

Research Assignment/Seminar **20%**

Final Exam **40%**

TOTAL POINTS: 100

Tentative Grade Scale:

A = 88 -100

B = 78 – 87

C = 68 – 77

D = 58 -57

Course Objectives

This course is designed to provide undergraduate students with an overview of the need for chemical analysis in the environment. While we cannot hope to cover all the topics of significance to environmental analysis, you will be exposed to some selected issues coming from the real world such as accidents or common pollution sources, used as a pretext to introduce problems, some analytical tools and a selection of analytical methodology.

Course Outline (Tentative)

1. Introduction and Review. Concepts in Analytical Chemistry: Analytical properties and analytical processes. Chemical information and the environment.
2. Olive oil mill wastewaters. Spills and problems. Major constituents of water. Titrimetric and spectrophotometric techniques
3. The mine tailing accident at Aznalcollar (Spain). Metal pollution in freshwater environments. Atomic techniques in trace metal analysis. Water sampling. Atomic absorption spectrometry.
4. Exxon Valdez and Prestige marine oil spills. Environmental effects. Polynuclear aromatic hydrocarbon analysis. Preconcentration. Chromatographic techniques.
5. Seveso and Bhopal industrial accidents. Organics in the atmosphere. Sampling and preconcentration. Hyphenated analytical techniques.
6. Combustion gases in the atmosphere and global warming. Spectrometric direct monitoring: Infrared photometric analysers and LIDAR technique.
7. Hazardous waste sites. Monitoring techniques for volatile organic compounds. Sensors.
8. Lead in wine. Tracking leaded gasoline. Speciation techniques.
9. Pesticides at work. An everyday story. Immunochemical Methods

Tentative Lecture Schedule

Date	Lecture Topic
8/31	The Environment and Analytical Chemistry (RR/Ch. 1; FH/Ch. 1)
9/7	Olive oil mill wastewaters (handouts) Analysis of major constituents in water (RR/Ch. 3) Titrimetry (FH/4.1-4.2) and spectrophotometry (FH/6.8 and 8.2)
9/14	Surface water characterization in the lab
9/21	The mine tailing accident at Aznalcollar (Spain) (handouts) Trace pollutants in water (RR/4.3). Atomic Absorption spectrophotometry (FH/7.6)
9/28	Marine oil spills of Exxon Valdez and Prestige. Environmental effects (handouts) Chromatographic techniques (RR/4.2; FH/5.3; FH/19.6; FH/19.7)
10/5	HPLC determination of PHA in water
10/12	Industrial accidents of Seveso and Bhopal (handouts) Hyphenated chromatographic techniques (RR/8.2; FH/8.5)
10/19	Combustion gases in the atmosphere and global warming (handouts) Analytical strategies. (RR/Ch. 6; FH/14)
11/2	Hazardous waste sites (Handouts) Monitoring techniques for volatile organic compounds (RR/5.3, 5.4; FH/14.6)
11/9	Trihalomethanes determination in drinking water
11/16	Lead in wine. Tracking leaded gasoline (Handouts) Speciation concept and speciation techniques (RR/4.3; FH/13)
11/30	Pesticides at work. An everyday story (handouts) Immunochemical Methods (RR/4.2; FH/20.5)
12/7	ELISA determination of triazine herbicides in water and soil
12/14	Exam