INSTRUMENTAL METHODS IN ENVIRONMENTAL SCIENCES WINTER 2017
EHS 410A
ID 842 619 200

Tuesdays 1p-2:50p in CHS 41-235
Fridays 10a-11:50a in CHS 51-279

Drs. Shane Que Hee (CHS 56-071A, squehee@ucla.edu, 67388) and Mel Suffet (CHS 61-295, msuffet@ucla.edu, 61242)

Aims: The theory and principles of instrumental methods are investigated through lectures, group discussions, and assignments.

Learning Outcomes: Students will be able to define, understand, and explain fundamental concepts of environmental and occupational analytical chemistry. They will be able to understand, explain, and select instrumental techniques to analyze biological and environmental media based on the type of molecule and element, in addition to being able to locate, explain, and understand techniques to screen compounds and elements in these media. Furthermore, practice in accessing the literature that contains these techniques will enable any literature technique to be located and its usefulness evaluated relative to the desired analytical objective. The strengths and weaknesses of laboratory and direct reading instrumentation will be understood, and be able to be explained and articulated. The need for calibration and standardization procedures will be able to be explained and justified as will be measures of precision, accuracy, sensitivity, and selectivity.

The environmental health competencies for MS students are the following: A1 Retrieve and organize literature; synthesize and critically evaluate scientific literature in environmental health, public health and other relevant fields; A2 Use existing databases to provide background information or data to address research questions and draw appropriate inferences/ estimates from environmental health data; A3 Evaluate seminars and presentations in environmental health and distill the critical and salient issues from them; B4 Identify potential sources of systematic error (bias) as well as random error; C1 Use computer systems and analytic software packages; D1 Make reasonable inferences from results of analysis of observational and analytic studies; E1 Prepare presentation materials including outlines, posters, and Powerpoint presentations; E2 Deliver effective oral presentations individually and as part of a team; E3 Explain and interpret research findings for students, professionals, the public, and media; F4 Identify and implement appropriate safety controls and practices.

The EHS Master of Public Health competencies involved are: C3 Describe federal and state regulatory programs, guidelines, and authorities that control environmental health issues; C5 Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety; C6 Identify key sources of data and use existing databases to provide background or supportive data to address environmental health questions.

The following cross-cutting public health competencies are also reflected in the design and content of the course: communication and informatics; leadership; professionalism; program planning; systems thinking.

Format: There are 2-hr lectures two days a week.

Dr. Suffet teaches chromatography, and Dr. Que Hee the rest.

Evaluation: There is one assignment on spectroscopy and another on chromatography, both requiring at least 20 hr of work each. The Midterm and Comprehensive Final Examinations are **closed book**.

TEXTBOOK: DA Skoog, FJ Holler, SR Crouch. *Principles of Instrumental Analyses*, 6th Ed., Saunders,New York, 2007. Biomedical Bookstore. Also in Biomedical Library Class Reserve and COEH Library CHS46-060
Please bring to each lecture if you purchase a copy.

2017 Lecture Schedule:

WEEK	DATE	TOPIC
1	**1/10,13**	Introduction; Chromatography
2	**1/17,20**	Chromatography
3	**1/24,27**	Chromatography
4	**1/31,2/3**	Chromatography
5	**2/7,2/10**	Instruments-Spectroscopy
6	**2/14,17**	Spectroscopy, ultraviolet, infrared
7	**2/21**	**Midterm Examination. Chromatography assignment due**
7	**2/24**	Mass Spectrometry-Inorganic
8	**2/28,3/3**	Mass Spectrometry-Organic;Radiochemistry
9	**3/7,10**	Radiochemistry; Electrochemisry
10	**3/14,17**	Electrochemistry; Immunoassays,Other

Mon 3/20 3p-6p Room TBA **Final Examination Spectroscopy/Spectrometry assignment due**

OTHER READING

1. JM Miller. *Chromatography: Concepts and Contrasts*, 2nd Ed., John Wiley, New York, New York, 2005. Biomed Bookstore/Biomedical Library Class Reserve. This is Professor Suffet's recommended textbook for his section.
2. HH Willard, LL Merritt Jr, JA Dean, FA Settle Jr. *Instrumental Methods of Analysis*, 7th Ed., Wadsworth, Belmont, California, 1988. Chem Library
3. RM Silverstein, GC Bassler, TC Morrill. *Spectrometric Identification of Organic Compounds*, 5th Ed., John Wiley, New York, New York, 1991. Chem Library
4. LH Keith. *Principles of Environmental Sampling*, Amer. Chem. Soc., Washington DC, 1988. Chem Library
5. JP Lodge Jr (Ed). *Methods of Air Sampling and Analysis*, Intersociety Committee, Lewis Publishers, Boca Raton, FL, 1989. Biomed Library
6. LS Clesceri, AE Greenberg, RR Trussell. *Standard Methods for the Examination of Water and Wastewater*, 20th Ed., Amer. Publ. Health Assoc., Washington DC.,1998. Biomed Library
7. FW Fifield, PJ Haines. *Environmental Analytical Chemistry*, Blackie Academic and Professional, New York, 1995. Biomedical Library (not on reserve)
8. FW Fifield, D Kealey. Principles and Practice of Analytical Chemistry,4th Ed,Blackie, New York, 1995.

9. SS Que Hee. *Hazardous Waste Analysis*, Government Institutes, Rockville, MD, 1999. See also EHS 258.

VIDEOS:
Class Reserve Librarian of the Biomedical Library. They cannot be taken out. Please view them at some time during the course. Please rewind once you are finished. They cover only Dr. Que Hee's part of the course.

1. *Calibration, Accuracy, and Error*. Insight Media, IM 16,2010.30 min.
2. *Ultraviolet Spectroscopy*, Films for the Humanities and Sciences, 1995,X-ULT. 45 min
3. *Program 15: Using a Flame Photometer, Using an Atomic Absorption Spectrometer, Thermogravimetric Analysis*, Films for the Humanities & Sciences,FFH 5858, 1996. X-ATO
4. *Techniques in Basic Infrared Spectrophotometry*, Am. Chem. Soc.,1986,X-TEC, 85 min.
5. *Mass Spectrometry*, Films for the Humanities and Sciences,1995,X-MAS.30 min
6. *Radiation and Your Environment*, VETI, X-RAD, 1989. 20 min.
7. *Oxidation*, Films for the Humanities and Sciences, 1995, X-OX1, 35 min.
8. *An Introduction to Environmental Immunoassays*,Millipore,1992,X-RAM C.1, 15 min.