UCLA School of Public Health
EHS 401
Environmental Measurements

Course Syllabus—Spring Quarter, 2018

Week I April 2, 4	June 6
Week II April 9, 11	Introduction to Environmental Measurements. Chemical analysis, planning, sampling and sample pretreatment, quality control.
Week III April 16, 18	Water Quality Measurements Physical examination (color, solids, turbidity, etc.). Brief discussion of spectrophotometer, visual comparators, and nephelometric methods.
Week IV April 23, 25	Water Quality Measurements Determination of inorganic elemental contaminants (nitrate, oxygen, fluoride, etc.). Brief discussion of ion chromatography.
Week V April 30, May 2	Air Quality Measurements Criteria pollutant measurement and monitoring (oxides of sulfur, nitrogen, carbon, and ozone).
Week VI May 7, 9	Air Quality Measurements Criteria pollutant measurement and monitoring (particulate monitoring methods, inorganic species technique).
Week VII May 14, 16	Inorganic Species Measurements Inorganic species (metallic constituents). Brief discussion of AA and ICP.
Week VIII May 21, 23	Inorganic Species Measurements Metallic constituents: modifications to AA and ICP for metallic determinations: Hydride generation and cold vapor techniques; graphite furnace.
Week IX May 28 May 30	Organic Species Measurements Extractable organic pollutants/GC-Mass analysis.
Week X June 4	Memorial Day (holiday) Organic Species Measurements Extractable organic analysis: Fluorometric techniques.

Biological Monitoring	live respondents, sample preparation, techniques and measurements.
Tissue collection from	Class summary.

Reading List

The reading list evolves during the course according to classroom discussion, questions posed by students, etc.

The standard reading list is as follows:

1. *Aquatic Chemistry* by Werner Stumm and James Morgan. Wiley-Interscience, 3rd edition, 1996.
2. *Standard Methods for the Examination of Water and Waste Water* by the American Public Heath Association, the American Water Works Association, and the Water Environment Federation. 2012.
3. *Microbial World* by R. Y. Stanier, J. L. Ingraham, M. L. Wheelis, and P. R. Painter. Princeton Hall College Publisher, 1986
4. *Brock Biology of Microorganisms* by M. T. Madigan, J. M. Martinko, K. S. Bender, D. H. Buckley, D. A. Atahl, and T. Brock. Benjamin Cummings, 2014.
5. *Fundamentals of Air Pollution* by Daniel Vallero. Academic Press of Elsevier, 2014.
6. *Air Quality Management Plan 2012* by the South Coast Air Quality Management District.
7. *Wintrobe Clinical Hematology* by John P. Greer, Daniel A. Arber, Bertil Glader, Alan F. List, Robert T. Means, Jr., Frixas Paraskevas, George M. Rodgers, and John Foerster. Wolters Kluwer Lippincott Williams and White, 2013.
8. *Methods of Air Sampling and Analysis* by James P. Lodge. CRC Press, 1988.
9. *Indoor Air Quality: The Latest Sampling and Analytical Methods* by Kathlan Hess-Kosa. Taylor and Francis Group, LLC, CRC Press, 2011.
10. *Environmental Field Testing and Analysis Ready Reference Handbook* by Gershon Shugar and Donald Drum. McGraw Hill, 2000.
11. *Exposure Assessment in Environmental Epidemiology* by Mack J. Nieuwenhuijen (ed.). Oxford University Press, 2015.

Learning Objectives

The goals of the course are to provide an understanding of environmental measurement principles to public health students and those from other engineering programs on campus. The principles include the understanding of field and laboratory sample collection and analysis in the areas of water chemistry, air chemistry, soil chemistry and environmental exposure assessment/biological monitoring. Techniques

in gravimetric analysis, volumetric analysis, spectrophotometric analysis employing uv-vis , atomic absorption , ICP-MS technology, and GC-MS techniques are presented. In addition field trips to local agencies are conducted to places of the Santa Monica Water Treatment facility, AQMD monitoring sites, and local labs on the UCLA campus.

Core Competencies

The goals for learning objectives and core competencies for the course EHS 401 are similar to those listed for MS/MPH candidates in environmental health sciences.

The course strives to incorporate chemistry and biological principles in the understanding of environmental measurements. Students completing the ten-week course should be able to:

- gain an understanding of the chemical principles to determine chemical and biological species in air, water, and soil systems using chemistry, microbiological, and limnological principles and techniques;
- gain an understanding of the methods and technologies available for the sampling of air, water, and soil environments;
- gain an understanding of volumetric laboratory analysis for such determinations as water hardness, dissolved oxygen, and biochemical oxygen demand; field sampling methods using various environmental sampling kits can be described and demonstrated (e.g., use of Hach Kits);
- gain an appreciation for instrumentation of UV-Vis and atomic absorption spectrophotometry and ion chromatography through laboratory demonstrations of such technology; visits to field sites where such technology is utilized and data viewed;
- gain an appreciation for tissue sampling from live respondents where excessive and normal exposures are experienced;
- gain an appreciation for dietary, workplace, and ambient exposure through questionnaire assessments to corroborate levels determined on tissue samples, exposed air, etc.;

Core competencies in the above knowledge objectives will be developed through the application of mathematical and analytical chemical principles to the environmental measurements discipline. These mathematical and chemical techniques will be applied to the determination of chemical concentrations of analytes through the use of calibration curves, scatter plots, regression coefficients, gravimetric factor analysis when applied to sample solutions. Familiarity with other environmental measurement programs on campus and at local academic institutions and agencies will be pursued through program visits and field orientation with local governmental agencies and environmental treatment facilities.