

ENVH 432

Environmental and Occupational Sampling and Analysis II

Winter, 2009

Class Website: <http://courses.washington.edu/envh432>

Course Overview

Instructors: Chris Simpson
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Class schedule:

Section A: Mondays, HSB, T478, 2:30-3:20 (lecture)
Section AA: Wednesdays and Fridays, T568-574, 12:30-3:20 (lab)
Section AB: Tuesdays and Thursdays, T568-574, 9:30-12:20 (lab)

Final: Tuesday, March 17, 2007, 630-820P; HSB, T478

Class Text:

Quantitative Chemical Analysis, 7th edition, by Daniel C. Harris
On reserve in Odegaard and Chemistry libraries, also available from
instructors.

Course Description:

This class is the second in a 3 quarter series intended to give students a background and some familiarity with measurement for environmental assessment. The focus of ENVH 432 is detection, sampling, and analysis of chemical hazards in different samples from occupational or environmental settings. This is an introductory course, potentially leading to more specific courses on sampling and analysis of air, water, wastewater, marine samples, soils, occupational hazards, etc.

Course Learning objectives:

At the end of this course, students should be able to accomplish the following:

1. Identify literature sources of standard methods for environmental and occupational assessment of chemical contaminants, and provide a framework for method selection.
2. Develop and apply a sampling strategy to adequately characterize chemical contaminants in air, water, and solid environmental media.
3. Describe basic concepts in quality control and quality assurance for chemical measurement data.
4. Critically evaluate the reliability of chemical measurement data.
5. Develop analysis plans for measurements of four different chemical contaminants in environmental and occupational samples. Your analysis plans will include selection of appropriate analytical methods and design of appropriate experimental procedures to ensure reliable data
6. Recognize the operating principles, advantages and limitations of several kinds of currently-used semi-quantitative field indicators. Demonstrate proficiency in the use of these devices.
7. Recognize the operating principles, advantages and limitations of several kinds of currently-used field meters for chemical agents. Demonstrate proficiency in the use of these devices.
8. Demonstrate knowledge of the operating principles, advantages and limitations of several kinds of major kinds of laboratory instruments used for chemical analysis, including: FTIR, UV/visible absorption spectrometers, gas chromatographs, atomic absorption spectrometers. Demonstrate proficiency in the operation of these devices.
9. Demonstrate the ability to work effectively and co-operatively as part of a team.
10. Demonstrate competency in technical writing.
11. Describe health hazards associated with at least four important chemical agents found in environmental and occupational settings, and hazards associated with the analytical procedures used to measure those contaminants.

Class organization:

Refer to the class schedule. The course consists of lectures every Monday and lab sessions every Wednesday and Friday (section AA) or Tuesday and Thursday (section AB). The first lab sessions (in the 1st week) are devoted to basic techniques that will be used later in the course: preparation of standards, calibration of equipment. The remainder of the course is comprised of 4 lab modules: air, water/wastewater, solid media, and airborne particles. Teams of 3-5 students will carry out each module, which typically have a lab preparation session, a field sampling day, a sample prep session and a lab measurement session.

Class assignments that are turned in for grading include one take home assignment, pre-lab quizzes and the written reports for each lab module or experiment (as specified in each module description). However, this is intended to be a hands-on course and requires

preparation in the form of collecting information, planning activities, calculating standard amounts or sampling times, etc, and each student is accountable to their team members to have done the needed preparation prior to class.

Grading:

The final grade will be determined as the weighted mean of the components listed below. The weighted average will be converted to a numeric grade between 0 to 4.

(1) Class participation	10%
(2) lab modules and experiment reports	35%
(3) take home assignments (3)	15%
(4) quizzes	10%
(5) final exam	30%

Students with Disabilities:

To request academic accommodations due to a disability, please contact Disabled Student Services, 448 Schmitz, 206-543-8924 (voice/TTY). If you have a letter from Disabled Student Services indicating that you have a disability that requires academic accommodations, please present the letter to me so we can discuss the accommodations you might need in this class

Week	lecture session (monday) & topic	Lab sessions				Lab topic
		Tu	We	Th	Fr	
1 (1/5/09)	intro, lab safety	√	√			solution phase std prep & chlorine determination
2 (1/12/09)	Exptl. design/QA & QC/errors (Dr Simpson)	√	√	√	√	round-robin 1
3 (1/19/09)	No class (MLK day)	√	√	√	√	round-robin 1
4 (1/26/09)	Anatomy of a lab report (Dr Simpson)	√	√	√	√	round-robin 2
5 (2/2/09)	Sample prep (Dr Onstad)	√	√	√	√	round-robin 2
6 (2/9/09)	FTIR, AA & XRF (Mr Monteith)	√	√	√	√	round-robin 3
7 (2/16/09)	No class (presidents' day)	√	√	√	√	round-robin 3
8 (2/23/09)	Chromatography (Dr Onstad)	√	√	√	√	round-robin 4
9 (3/2/09)	Mass Spectrometry (Dr Simpson)	√	√	√	√	round-robin 4
10 (3/9/09)	Revision session	No lab this week				
11 (3/16/09)	Exam Week					

Experiment 1	particles	gravimetry and nephelometry
Experiment 2	gases (CO/CO ₂)	tubes, DRIs, FTIR
Experiment 3	lead in paint	test kit, XRF, AA
Experiment 4	disinfection by-products in water	GC and test-kit