ENVH 432: Environmental and Occupational Sampling and Analysis II

Winter, 2016
Canvas website: https://canvas.uw.edu/courses/1022503

Course Overview

Instructor: Gretchen Onstad, PhD
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Class schedule:

Lecture: Mondays, SoCC 308, 2:30-3:20
Laboratory: Tuesdays and Thursdays, T568-574, 9:30-12:20
Final: Tuesday, March 15, TBA, 4:30-6:20pm

Class Text (optional):

Quantitative Chemical Analysis, 7th, 8th or 9th edition, by Daniel C. Harris
On reserve in Health Sciences Library and HSB F226.
Fundamentals of Environmental Sampling and Analysis by Chunlong Zhang, Hoboken, N.J: Wiley-Interscience, 2007, available as eBook

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, and occupational hazards.

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.

Course organization:

The course consists of lectures every Monday and lab sessions Tuesday and Thursday (see Schedule). The first lab session is 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, solid media, and airborne particles. Teams of 5-6 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 article questions, 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, 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 and 4.

1)	Pre-labs	10%
2)	Lab Reports	40%
3)	Journal Article Questions	10%
4)	Participation	10%
5)	Final Exam	30%

Pre-labs (10%):

Pre-labs are designed to prepare students for conducting the laboratory experiments. Pre-lab quiz questions will be emailed to students by the Friday prior to starting each lab module. Most questions can be answered by reading the lab or lecture materials, or additional resources posted on the lab module.

Lab Reports (40%):
Each lab group prepares a report and receives a collective grade for the modules. Specific roles and responsibilities are outlined in the "Round-robin" handout. Each lab report counts as 10% of the total grade. Individual students can improve their lab report grade by submitting draft sections and reviewing their peers' sections prior to the final lab report submission.
Reminder: Students are expected to reference all work and give appropriate attribution for all materials cited, including any reference to websites or articles.

Journal Article Questions & Discussion (10%):
Students are expected to read the methods section of an assigned Article (1-5) and answer questions prior to each lecture. Questions will be incorporated into lectures and occasional group discussions. The practice (Chlorine) Lab in the first week will also be graded in this category. Article 6 is chosen by each lab group and presented to the class during Lecture 6.

Participation (10%):
Students are graded individually on class and laboratory session participation. Ways to earn these points include asking questions in class, actively contributing to laboratory sessions and promoting teamwork in lab groups. **Please notify the course instructor or TA, if you will not be able to attend a class.** Keep in mind that, every time you are late or absent, you place a burden on your team members to fulfill your assigned role.
Common Courtesy: We expect students attending class to give their full attention to class activities; so please, no use of computers or cell phones, including texting, during class, unless needed for data analysis in lab sessions. Thank you!

Final Exam (30%):
Students are graded individually on completion of an in-class final exam. This is a closed-book and closed-note exam. Students must bring a calculator (no cell phones). The exam is composed of matching, multiple choice, story problems with calculations, and essay questions. The essay question does not change from year to year. A practice exam is posted on the course website.

Academic Integrity
Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity. The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and the SPH Academic Integrity Policy. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington Community Standards and Student Conduct website.

Writing Resources: A self-test for plagiarism is available and additional resources are posted on the course website under Pages/Plagiarism. The UW Bothell Writing Center provides additional resources for English as a second language (ESL) students: http://www.uwb.edu/wacc/for-students/eslhandbook

Access and Accommodations
Your experience in this class is important to us, and it is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal

and state law. If you experience barriers based on a disability or temporary health condition, please seek a meeting with Disability Resources for Students (DRS) to discuss and address them. If you have already established accommodations with DRS, please communicate your approved accommodations to your instructor at your earliest convenience so we can discuss your needs in this course.

DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (this can include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu.

If you have a disability that is not recognized by DRS, please feel free to discuss it with me if you feel it will impact your performance in the course.

Schedule, Winter 2016 (most current version on Calendar menu of course website)

Week	***Lecture Topics***	***Monday*** 2:30-3:20 pm	***Tuesday*** 9:30am-12:20pm	***Thursday*** 9:30am-12:20pm
1: Jan 4	Round-Robin Roles & Lab Reports	Course Overview	Lab Safety Chlorine Lab due	**No lab class** Survey due
2: Jan 11	QA/QC	Lecture 1 Article 1 due	Lab 1 Pre-lab 1 due	Lab 1
3: Jan 18	**No class**	**HOLIDAY**	Lab 1	Lab 1
4: Jan 25	Sample Preparation	Lecture 2 Article 2 due Section Draft 1 due	Lab 2 Pre-lab 2 due Review 1 due Wed	Lab 2 Report 1 due Fri
5: Feb 1	Chromatography	Lecture 3 Article 3 due	Lab 2	Lab 2
6: Feb 8	Spectroscopy (Graeme Carvlin)	Lecture 4 Article 4 due Section Draft 2 due	Lab 3 Pre-lab 3 due Review 2 due Wed	Lab 3 Report 2 due Fri
7: Feb 15	**No class**	**HOLIDAY**	Lab 3	Lab 3
8: Feb 22	Mass Spectrometry (Dr. Chris Gill)	Lecture 5 Article 5 due Section Draft 3 due	Lab 4 Pre-lab 4 due Review 3 due Wed	Lab 4 Report 3 due Fri
9: Feb 29	Method Comparison Presentations	Lecture 6 Article 6 due	Lab 4	Lab 4
10: Mar 7	Review for Final	Review Session Section Draft 4 due	**No lab class** Review 4 due Wed	**No lab class** Report 4 due Fri

Group Assignments for Labs 1-4 will be posted on Friday, January 8th.

Experiment A	particles	gravimetry and nephelometry
Experiment B	gases (CO/CO2)	tubes, DRIs, FTIR
Experiment C	lead in paint	test kit, XRF, AA
Experiment D	disinfection by-products in water	GC and test-kit