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# ENV H 432

## Chemical Sampling & Analysis

5 Credits, Graded

**Spring 2023**

**Lab:** Mon & Weds, HSB T568 8:30-11:30am

**Lecture:** Mon, HSB T473 2:30-3:20pm

**Instructor:** Chris Simpson

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**Office Hours:** by  
appointment

**TA:** Mariah Dittmore  
Sierra Brown

**Office Hours:** by  
appointment

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## Course Overview & Format

This class gives students a background and some familiarity with measurement for environmental assessment. The focus of the course 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.

## Prerequisites

General Chemistry.

## Learning Objectives

By the end of this course, students will demonstrate the ability to:

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 laboratory instruments used for chemical analysis, including: FTIR, UV/visible absorption spectrometers, gas chromatographs, and 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.

## Textbooks & Readings

There is no required text for this course, however the following texts are recommended:

- *Quantitative Chemical Analysis*, 7<sup>th</sup>, 8<sup>th</sup> or 9<sup>th</sup> edition, by Daniel C. Harris. Available through UW Libraries.
- *Fundamentals of Environmental Sampling and Analysis* by Chunlong Zhang, Hoboken, N.J.: Wiley-Interscience, 2007, available as [eBook](#) through UW Libraries.

## Course Website

All materials, assignments, etc. for this course will be available through the Canvas course website.

## Student Assessment

The overall course grade will be based on:

10%	Pre-labs
20%	Assignments
30%	Lab Reports
10%	Class participation
30%	Final exam

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. The questions can be answered by reading the lab or lecture materials, or additional resources posted on the lab Module of the course website.

Assignments (20%): Weekly problem sets are assigned to assess your understanding of the theoretical material covered in the lecture sessions, and your ability to apply those concepts to environmental and occupational exposure scenarios.

Lab Reports (30%): Each lab group prepares a report and receives a collective grade for each of the lab modules. Specific roles and responsibilities are outlined in the “Round-robin: Groups & Roles” handout. Each of the four lab reports counts equally towards the total grade. Note that

lab reports are substantial documents, typically 10-20 pages in length and require substantial out-of-class time commitment to summarize, process, interpret and report your experimental findings. Students are expected to reference all work and give appropriate attribution for all materials cited, including any reference to websites or articles. To aid in preparing these group lab reports, students also upload draft sections of the lab reports for review by your peers and the TAs, and review draft lab report sections provided by your lab group peers.

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, submitting lab-section write-ups and peer reviews on time, and promoting teamwork in lab groups. **Please notify the course instructor, your group-mates and the TA, if you will not be able to attend a class due to illness, or other exceptional circumstances.** 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**: Part of the quality of your participation is your being responsible for managing your workspace and materials. That means cleaning up after yourself, labeling all materials you will leave in the lab between sessions, and cooperating with classmates in sharing the lab resources including bench space. Untidy, unsafe, or disruptive behavior will be noted and will affect your final "Participation" score.

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.

## Use of Electronic Devices in Class

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!

## Accessing TAs for Help

We recommend using the Canvas Discussion Board for questions about assignments or concepts from lecture or assigned readings (first thing to try). The TAs will be tracking the board and will provide input as needed. You are welcome to ask TAs for help during lab sessions (second thing to try), but if a need arises for more one-on-one help, you can make an appointment with one of the TAs (third thing to try), either in person during class or by email. TA email links are on the Canvas course home page.

## Course Organization

Refer to the Schedule on the Canvas course site. The course consists of lectures every Monday and lab sessions Mondays and Wednesdays. 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 four lab modules: air, water, solid media, and airborne particles. Teams of approximately five students will carry out each module, which typically includes 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 pre-lab quizzes, draft lab report sections, peer reviews, weekly assignments and the written reports for each lab module or experiment. 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.

## Land Acknowledgement

The University of Washington acknowledges the Coast Salish people of this land, the land which touches the shared waters of all tribes and bands within the Duwamish, Suquamish, Tulalip and Muckleshoot nations.

## COVID-related expectations

Per UW policy, this class will be conducted in person. Since this is primarily a hands-on laboratory class, we are unable to offer a remote option for taking this class. Therefore, you should only register for this class if you can attend in person.

All UW students are expected to complete their [vaccine attestation \(Links to an external site.\)](#) before arriving on campus. [Per President Cauce's message March 8, \(Links to an external site.\)](#) following changes to state and local health policies, masks will become optional inside most University facilities starting March 28, the first day of spring quarter. Masks will continue to be required in clinical and other health-care settings and on public transportation, including UW shuttles. **However, we strongly encourage you to continue wearing masks in class, because you will be working in close proximity to your fellow students and the instructors, and social distancing will not be possible in the laboratory.** Please monitor yourself daily for symptoms and stay home if you are sick. It's also strongly recommended to get tested after travel. Refer to the [UW Face Covering Policy \(Links to an external site.\)](#) for the latest guidance and follow the campus-wide face-covering policy at all times. You are expected to follow state, local, and UW COVID-19 policies and recommendations. If you feel ill or exhibit possible COVID symptoms, you should not come to class. If you need to temporarily quarantine or isolate per CDC guidance and/or [campus policy \(Links to an external site.\)](#), you are responsible for notifying your instructors as soon as possible by email. **If you receive a positive COVID-19 test result, you must report to campus Environmental Health & Safety (EH&S) by emailing [covidehc@uw.edu](mailto:covidehc@uw.edu) or calling 206-616-3344.**

**Please check your email daily BEFORE coming to class.** If we need to cancel a class session because the instructor or a guest speaker is complying with UW policies and unable to attend in person, we will send all registered students an email announcing the cancellation, and outlining a plan to catch-up on any cancelled sessions.

## Access and Accommodations

Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions 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](mailto:uwdrs@uw.edu) or [disability.uw.edu](http://disability.uw.edu). 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. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

## UW Academic Integrity Statement

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.

## Religious Accommodations

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at [Religious Accommodations Policy](#). Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request](#) form.