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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, HSEB 245 2:30-3:20pm

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**Office Hours:** by  
appointment

**TA:** Ikwon Jin

Lilian Liu

**Office Hours:** by  
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## 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.

## Illness Protocols and Safety

If you feel ill or exhibit respiratory or other symptoms, you should not come to class. Seek medical attention if necessary and notify your instructor(s) as soon as possible by email.

Please check your email daily BEFORE coming to class. If we need to conduct class remotely because the instructor or a guest speaker is unable to attend in person, we will send all registered students an email with a Zoom link for remote instruction or a plan for making up the class.

### Additional recommendations include:

1. [Get boosted with the updated COVID-19 vaccines.](#) These vaccines are available at clinics and pharmacies, as well as [through UW Medicine](#) and local health agencies.
2. [Get your annual flu shot.](#)
3. **Wear a high-quality mask in indoor public spaces and while traveling. Masks are strongly recommended the first two weeks of spring quarter.** High-quality masks help protect against a range of respiratory viruses, and are [available for free in locations on each UW campus.](#)
4. **Take a coronavirus test if you have symptoms or have been exposed.** Rapid antigen tests are widely available for [free at on-campus locations linked here.](#) The [Husky Coronavirus Testing](#) voluntary research study is also available for UW students.
5. [Activate WA Notify on your phone](#) to receive exposure notifications and so that you can anonymously let others know of their exposure if you test positive.

## 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.

## ACCREDITATION REQUIREMENTS & COMPETENCIES MET BY COURSE

**Council on Education for Public Health (CEPH)** competencies met by this course include:

### D-10-1 Public Health Domains

- **Role and Importance of Data in Public Health:** Address the basic concepts, methods, and tools of public health data collection, use, and analysis and why evidence-based approaches are an essential part of public health practice
- **Determinants of Health:** Address the socio-economic, behavioral, biological, environmental, and other factors that impact human health and contribute to health

disparities (this course covers environmental factors impacts on human health and health disparities)

- **Project Implementation:** Address the fundamental concepts and features of project implementation, including planning, assessment, and evaluation
- **Health Communications:** Address the basic concepts of public health-specific communication, including technical and professional writing and the use of mass media and electronic technology (this course covers technical writing)

### D13-1 Concepts

- Research methods

## 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.

## Students with Disabilities: 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.