

ENV H 516 A: TOXIC AGENTS: EFFECTS AND MECHANISMS

Spring 2025

CONTACT INFORMATION

Instructor: Toby B. Cole (*he/him/his*), Clinical Assistant Professor, DEOHS

Contact: tobycole@uw.edu

Office hours: By appointment; Institute on Human Development & Disability, Room #CD288.

Course times and locations

Lecture: Monday & Wednesday, 8:30 – 9:50 AM; Friday 8:30 – 9:20 AM; HSEB 426.

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 PROTOCOL

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. Follow the [COVID-19 Public Health Flowchart](#) if you have COVID-19 symptoms, exposure or test positive, and adhere to the [UW Face Covering Policy](#).

Additional recommendations include getting your [annual flu shot](#) and getting boosted with the updated COVID vaccines (available [at clinics and pharmacies, as well as through UW Medicine](#) and local health agencies).

Please check your email and CANVAS announcements 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 and/or post a CANVAS announcement with a Zoom link for remote instruction or a plan for making up the class.

COURSE DESCRIPTION

ENV H 516 A is the second course of a two-course sequence (ENV H 515/516). The overall goal of the series is for students to expand the basic concepts and mechanisms of toxicology gained in ENV H 503 to understand how chemicals interact with biological systems to produce adverse effects, i.e., the science of toxicology. Thus, prerequisites for this series generally include having taken ENV H 503 and ENV H 515. While ENV H 515 focused on organ toxicology and organ systems, the content of ENV H 516 focuses on the most important **classes of toxic chemicals** (as well as physical and biological agents), their toxic effects in humans and animals, and the underlying mechanisms. There will be experts in some of the proposed topics providing guest lectures throughout the course. Lectures will cover the toxicology of natural toxins, metals, phthalates, BPA, PCBs, dioxins and other halogenated contaminants, PBDEs, PFAS, solvents, radiation, pesticides, air pollutants, and nanomaterials, as well as food toxicology, ecotoxicology, and clinical / occupational toxicology.

COURSE LEARNING OBJECTIVES

After completing this course, students will have acquired a fundamental understanding of the toxic effects of different agents. They will be able to identify major issues related to the toxicity of environmental agents, recognize toxic effects induced by these agents, explain mechanisms of toxicity, identify routes and nature of exposures, evaluate types of toxic effects, have a basic understanding of the main aspects of ecotoxicology, occupational toxicology and clinical toxicology, and their roles within toxicology, public health and environmental and occupational health sciences.

REQUIRED TEXTBOOKS & READINGS

Casarett & Doull's Toxicology, The Basic Science of Poisons, 9th Edition, Curtis D. Klaassen & John B Watkins III, McGraw Hill, 2021. Chapters in this textbook cover most topics taught in the class.

(This textbook is available as an eBook through the UW Libraries, or through this [website](#))

Recommended, optional, or supplementary readings

Additional reading material, handouts with slides, etc. will be available as Canvas Pages or Adobe Acrobat files that can be viewed on Canvas or downloaded. In some cases, the readings may be links to websites. Videos will also be available on Canvas Pages.

GRADING

Grades will be determined by weekly take-home quizzes (25%), midterm exam (35%), final exam (35%), and classroom participation (5%). Each of the two exams will cover all material presented in the preceding lectures. The final exam will be held during finals week but will not be a cumulative exam.

Weekly take-home quizzes

Weekly take-home quizzes covering the previous week's material will be posted to Canvas on Mondays and will be due by end of day Friday. These quizzes consist of multiple-choice, true/false, or matching questions. Students are free to use lecture materials, notes, and textbook chapters to answer the questions.

Midterm Exam

The midterm exam (Exam #1) covers the material in the first half of the course, and will be an in-person, closed-book exam consisting of 3-4 essay / short answer questions.

Final Exam

The final exam (Exam #2) is NOT a comprehensive exam. It covers only the material in the second half of the course, and will also be an in-person, closed-book exam consisting of 3-4 essay / short answer questions.

Grading Criteria

A 4.0 scale will be calculated using the following conversion:

4.0 Scale	Percentage	4.0 Scale	Percentage	4.0 Scale	Percentage
4.0	100%	3.1	86%	1.7	72%
4.0	99%	3.0	85%	1.6	71%
3.9	98%	2.9	84%	1.5	70%
3.9	97%	2.8	83%	1.4	69%
3.8	96%	2.7	82%	1.3	68%
3.8	95%	2.6	81%	1.2	67%
3.7	94%	2.5	80%	1.1	66%
3.7	93%	2.4	79%	1.0	65%
3.6	92%	2.3	78%	0.9	64%
3.6	91%	2.2	77%	0.8	63%
3.5	90%	2.1	76%	0.7	62%
3.4	89%	2.0	75%	0.7	61%
3.3	88%	1.9	74%	0.7	60%
3.2	87%	1.8	73%		

Late assignment policy

All quizzes must be submitted through Canvas by the due date. The instructor understands that in some instances, certain personal situations may make it impossible to submit a specific material on time. Please reach out to Dr. Cole as early as possible if you have extenuating circumstances.

Students are expected to attend class and to participate in all graded activities. A student who is anticipating being absent from class due to a Religious Accommodation activity needs to complete the Religious Accommodations request process by the second Friday of the quarter. Students who anticipate missing class due to attendance at academic conferences or field trips, or participation in university sponsored activities should provide a written notice to the instructor ahead of the absence. The instructor will determine if the graded activity or exam can be rescheduled or if there is equivalent work that can be done, as determined by the instructor.

To protect student privacy and the integrity of the academic experience, students will not be required to provide a medical excuse note to justify an absence from class due to illness. A student absent from any graded class activity or examination due to illness must request, in writing, to take a rescheduled examination or perform work judged by the instructor to be the equivalent.

Student responsibilities

Students are expected to participate in class by asking questions or providing comments to the lecturers, and by involvement in class discussions. Guest lecturers will be an asset to the course and will assist in providing coverage of subject areas within their respective areas of expertise. Over the course, there will be content posted on Canvas before and/or after each session. All sessions will be recorded and uploaded to Canvas for instructional purposes related to this class. Students are not permitted to copy or share the recording with others. If you have privacy concerns about Zoom recordings in this class, please contact the course instructor.

The instructor welcomes any feedback you may have to improve their teaching and this course.

COURSE SESSION SCHEDULE

Below is a tentative lecture schedule. Any changes will be announced in class and/or posted on Canvas.

Date	Topic	Instructor	Reading
3/31 (Mon)	Introduction / Overview	Toby Cole	
4/02 (Wed)	Animal & Plant Toxins I	Toby Cole	Chapter 26
4/04 (Fri)	Animal & Plant Toxins II	Toby Cole	Chapter 26
4/07 (Mon)	Ecotoxicology	Toby Cole	Chapter 30
4/09 (Wed)	Metals/metalloids I	Tom Lewandowski	Chapter 23
4/11 (Fri)	Metals/metalloids II	Tom Lewandowski	Chapter 23
4/14 (Mon)	Metals/metalloids III	Tom Lewandowski	Chapter 23
4/16 (Wed)	Metals/metalloids: IV	Tom Lewandowski	Chapter 23
4/18 (Fri)	Per- and Poly-fluoroalkyl Substances (PFAS)	Tom Lewandowski	Supplemental
4/21 (Mon)	Polychlorinated Biphenyls (PCBs)	Edward Kelly	Supplemental
4/23 (Wed)	Dioxins & Other Halogenated Chemicals	Edward Kelly	Supplemental
4/25 (Fri)	Polybrominated Diphenyl Ethers (PBDEs)	Julia Cui	Supplemental
4/28 (Mon)	Air Pollution	Toby Cole	Chapter 31
4/30 (Wed)	Air Pollution	Cora Sack	Chapter 31
5/02 (Fri)	Nanoparticle Toxicology	Chris Carosino	Chapter 29
5/05 (Mon)	Nanoparticle Toxicology	Chris Carosino	Chapter 29
5/07 (Wed)	Mid-term Exam (covers 3/31 - 4/25)		
5/09 (Fri)	Pesticides	Toby Cole / Lucio Costa	Chapter 22
5/12 (Mon)	Pesticides	Toby Cole / Lucio Costa	Chapter 22
5/14 (Wed)	Pesticides	Toby Cole / Lucio Costa	Chapter 22
5/16 (Fri)	Solvents: Aliphatic solvents	Toby Cole	Chapter 24
5/19 (Mon)	Solvents: Aromatic solvents	Toby Cole	Chapter 24
5/21 (Wed)	Solvents: Alcohols; Safer solvents	Toby Cole	Chapter 24
5/23 (Fri)	Phthalates & Bisphenol A (BPA)	Sheela Sathyanarayana	Supplemental
5/26 (Mon)	Memorial Day (no class)		
5/28 (Wed)	Radiation & Radioactive Materials	William Griffith	Chapter 25
5/30 (Fri)	Food Additives	Toby Cole	Chapter 27
6/02 (Mon)	Food Toxicology	J. Scott Meschke	Chapter 27

Date	Topic	Instructor	Reading
6/04 (Wed)	Occupational Toxicology	Katia Harb	Chapter 34
6/06 (Fri)	Clinical / Occupational Toxicology	Deborah Cherry	Chapters 33, 34
6/10 (Tue)	Final Exam 8:30 – 10:20 AM (covers 4/28 – 6/06)		

Communication and Writing Skills

Communication through writing and speaking is an important transferable skill for all career pathways. Establishing a strong foundation in communication skills will help you be successful throughout your future course work and career. Therefore, this course includes assignments with the goal to help you identify areas of strength and improvement in your communication. If you feel that you could benefit from additional opportunities to improve your writing skills in particular, a list of resources at the UW and others accessible online can be found on the SPH website [here](#).

IMPORTANT POLICIES & RESOURCES

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, unauthorized use of artificial intelligence (AI) tools, and other misconduct are serious violations of the University of Washington [Student Conduct Code \(WAC 478-121\)](#). 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](#).

Use of Generative Artificial Intelligence in Coursework

You may not submit work that is written wholly or partially by an AI tool. Artificial Intelligence tools, though useful in many contexts, are inappropriate for use in this course. An important outcome of this course is to strengthen your own abilities as a thinker and communicator. That is only possible when you do your own work. If your submission appears to have been written using AI, you may either receive a failing grade or be asked to resubmit.

Access and Accommodations

Your experience in this class is important to me. 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 have already established accommodations with Disability Resources for Students (DRS), please activate your accommodations via myDRS so we can discuss how they will be implemented 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), contact DRS directly to set up an Access Plan. DRS facilitates the interactive process that establishes reasonable accommodations. Contact DRS at disability.uw.edu.

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 \(https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/\)](https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/). Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request form \(https://registrar.washington.edu/students/religious-accommodations-request/\)](https://registrar.washington.edu/students/religious-accommodations-request/).

Inclusion & Diversity

Diverse backgrounds, embodiments and experiences are essential to the critical thinking endeavor at the heart of University education. In SPH, we are expected:

1. To respect individual differences, which may include, but are not limited to, age, cultural background, disability, ethnicity, family status, gender, immigration status, national origin, race, religion, sex, sexual orientation, socioeconomic status and veteran status.
2. To engage respectfully in the discussion of diverse worldviews and ideologies embedded in course readings, presentations and artifacts, including those course materials that are at odds with personal beliefs and values.
3. To encourage students with concerns about classroom climate to talk to their instructor, adviser, a member of the departmental or SPH EDI Committee, the Assistant Dean for EDI, or the program's director.

Classroom Climate

We are co-creators of our learning environment. It is our collective responsibility to develop a supportive learning environment for everyone. Listening with respect and an open mind, striving to understand others' views, and articulating your own point of view will help foster the creation of this environment. We engage our differences with the intent to build community, not to put down the other and distance our self from the other. Being mindful to not monopolize discussion and/or interrupt others will also help foster a dialogic environment.

The following guidelines can add to the richness of our discussion:

- We assume that persons are always doing the best that they can, including the persons in this learning environment.
- We acknowledge that systematic oppression exists based on privileged positions and specific to race, gender, class, religion, sexual orientation, and other social variables and identities.
- We posit that assigning blame to persons in socially marginal positions is counter-productive to our practice. We can learn much about the dominant culture by looking at how it constructs the lives of those on its social margins.

- While we may question or take issue with another class member's ideology, we will not demean, devalue, or attempt to humiliate another person based on her/his experiences, value system, or construction of meaning.
 - We have a professional obligation to actively challenge myths and stereotypes about our own groups and other groups so we can break down the walls that prohibit group cooperation and growth.
- [Adapted from Lynn Weber Cannon (1990). Fostering positive race, class and gender dynamics in the classroom. *Women Studies Quarterly*, 1 & 2, 126-134.]

We are a learning community. As such, we are expected to engage with difference. Part of functioning as a learning community is to engage in dialogue in respectful ways that supports learning for all of us and that holds us accountable to each other. Our learning community asks us to trust and take risks in being vulnerable.

Here are some guidelines that we try to use in our learning process:

- LISTEN WELL and be present to each member of our group and class.
- Assume that I might miss things others see and see things others miss.
- Raise my views in such a way that I encourage others to raise theirs.
- Inquire into others' views while inviting them to inquire into mine.
- Extend the same listening to others I would wish them to extend to me.
- Surface my feelings in such a way that I make it easier for others to surface theirs.
- Regard my views as a perspective onto the world, not the world itself.
- Beware of either-or thinking.
- Beware of my assumptions of others and their motivations.
- Test my assumptions about how and why people say or do things.
- Be authentic in my engagement with all members of our class.

Pronouns

We share our pronouns because we strive to cultivate an inclusive environment where people of all genders feel safe and respected. We cannot assume we know someone's gender just by looking at them. So we invite everyone to share their pronouns.

Bias Concerns

The Office of the Dean has a [student concern policy](#), a faculty concern policy and standard HR procedures for staff concerns. Our 2018 climate survey states that most people in SPH do not report bias incidents because they do not know where to go. Students are encouraged to report any incidents of bias to someone they feel comfortable with, including instructors, advisers or department staff. They can email dcinfo@uw.edu for immediate follow up. Bias concerns can be anonymously and confidentially reported via the online form found here: <https://sph.washington.edu/about/diversity/bias-concerns>. Data is collected by the Assistant Dean for EDI and the Director of Program Operations for Student and Academic Services and tracked for resolution and areas are identified for further training.

Sexual Harassment

Sexual harassment is a form of harassment based on the recipient's sex that is characterized by:

1. Unwelcome sexual advances, requests for sexual favors, or other verbal or physical conduct of a sexual nature by a person who has authority over the recipient when:
 - Submission to such conduct is an implicit or explicit condition of the individual's employment, academic status, or ability to use University facilities and services, or
 - Submission to or rejection of the conduct affects tangible aspects of the individual's employment, academic status, or use of University facilities.
2. Unwelcome and unsolicited language or conduct that creates an intimidating, hostile, or offensive working or learning environment, or has the purpose or effect of unreasonably interfering with an individual's academic or work performance.

If you believe that you are being harassed, or have observed harassment, you can report it to SPH using the [bias concerns link](#). The University also has designated offices to help you: [SafeCampus](#); [Office of the Ombud](#); [Title IX Investigation Office](#); and [University Complaint Investigation and Resolution Office](#).

Health & Wellness Support

We need to take care of ourselves inside and outside of class. Start with the Husky Health and Well-Being site for a comprehensive list of Husky Health and wellbeing supports on campus, including: food assistance, substance use, and getting connected to support at <https://wellbeing.uw.edu>.

For support within the School of Public Health, you can reach out to Jen Nguyen (jenquan8@uw.edu), advisors, or your instructors for additional support. Additional mental health support is available through the UW Counseling Center at 206.543.1240 or by going to <https://www.mentalhealth.uw.edu>.

UW also offers real-time and confidential connection to Licensed Mental Health counselors 24/7 through the Husky Helpline at 206.616.7777 as well as through chat through the website: <https://wellbeing.uw.edu/huskyhelpline/>.