

# Course Syllabus

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**DRAFT ENVH 405 Toxic Chemicals and Human Health: 3 credits**

Lectures: Mondays, Wednesdays & Fridays, 11:30 am - 12:20 pm

Office Hours with Sarah: Wednesday 4-5 pm, Friday 10:30-11:30 am

**Zoom into MWF regular session class:**

**Meeting ID: 934 8144 0256**

**Passcode: 740434**

**[Zoom Link for ENVH405](https://washington.zoom.us/j/93481440256?pwd=aEo4Q3EyQUk0eFZLKzJzWVJzTk9VUT09)**  **[\\_\(https://washington.zoom.us/j/93481440256?pwd=aEo4Q3EyQUk0eFZLKzJzWVJzTk9VUT09\)\\_](https://washington.zoom.us/j/93481440256?pwd=aEo4Q3EyQUk0eFZLKzJzWVJzTk9VUT09)**

**Zoom into 405 TA Sessions:**

**Meeting ID: 938 7388 5789**

**<https://washington.zoom.us/j/93873885789>**  **[\\_\(https://washington.zoom.us/j/93873885789\)\\_](https://washington.zoom.us/j/93873885789)**

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## Instructors

Dr. Terrance Kavanagh (he/him/his): [tjkav@uw.edu](mailto:tjkav@uw.edu) (<mailto:tjkav@uw.edu>)

Ms. Sarah Philo (she/her/hers): ([sphilo@uw.edu](mailto:sphilo@uw.edu) (<mailto:sphilo@uw.edu>))

## Guest Lecturers

Dr. Julia Cui (she/her/hers): [juliacui@uw.edu](mailto:juliacui@uw.edu) (<mailto:juliacui@uw.edu>)

Dr. Judit Marsillach (she/her/hers): [jmarsi@uw.edu](mailto:jmars@uw.edu) (<mailto:jmars@uw.edu>)

Dr. Brittany Weldon (she/her/hers): [brittany.a.weldon@gmail.com](mailto:brittany.a.weldon@gmail.com) (<mailto:brittany.a.weldon@gmail.com>)

## Textbooks

**Required:** *Casarett & Doull's Essentials of Toxicology, 4th Edition*, Curtis D. Klaassen & John B Watkins III, McGraw Hill, 2021

The text is available as an eBook through the UW Libraries. Or go directly to this website:

**<https://accesspharmacy-mhmedical-com.offcampus.lib.washington.edu/book.aspx?bookid=3000>**  
 **[\\_\(https://accesspharmacy-mhmedical-com.offcampus.lib.washington.edu/book.aspx?bookid=3000\)\\_](https://accesspharmacy-mhmedical-com.offcampus.lib.washington.edu/book.aspx?bookid=3000)**

**NOTE: You may have to log in to UW library services to access this book. Please contact Sarah if you have any difficulties.**

**Optional:** Introduction to Toxicology, 3rd Edition by John Timbrell, Taylor & Francis, 2002

## **Course Description**

This covers the basic principles governing the behavior and effects of environmental contaminants on biological systems, including: toxicity testing; disposition of environmental contaminants in the body; modifiers of response; fate and health effects of environmental contaminants, including damage to major organ systems; cancer; birth defects; and risk assessment and government regulation of environmental contaminants. The focus is on human health impacts of environmental contaminants in a public health context.

As per UW policies, this course will be taught remotely. **We will use Zoom to share the lecture live, at the scheduled time.** Lectures will also be recorded and posted to the cloud on Zoom, and slides will be available online. Please be patient throughout the quarter, as there might be technical difficulties. We will do our very best to keep these to a minimum. Please contact Sarah (sphilo@uw.edu) if you have any questions or concerns with this technology.

## **Learning objectives for ENV H 405**

The learning objectives for this course are based on fundamental concepts in the science and practice of toxicology. After having taken this course students will be able to:

- Identify significant figures and seminal events important in the history of toxicology, and the professional disciplines, job classifications and scientific fields occupied by toxicologists.
- Explain the principles of chemical dose-response, including quantal vs. continuous measures of response and the descriptors used to define individual susceptibility to toxicants.
- Discuss the different types of testing paradigms used to evaluate the toxicity of chemicals, including tests for acute, subacute and chronic toxicity; the various biochemical assays used to investigate mechanisms by which chemicals cause injury; and the ethical principles surrounding *in vitro* and *in vivo* testing.
- Explain the concepts of absorption, distribution, metabolism and excretion, and their integral roles as determinants of toxicity.
- Explain the biochemical basis of toxicant biotransformation including the key enzymes systems involved, phases of metabolism, and their consequences for toxicant disposition.
- Discuss the impact of genetic variation, diet, age, gender, and infectious disease status on toxicant disposition and dose-response relationships.
- Discuss the consequences of toxicant exposure for different organs, especially the liver, the kidneys, the brain, and the cardiovascular and endocrine systems, and why some toxicants target these organs.
- Identify susceptible periods of embryonic/fetal development that predispose to various kinds of chemically-induced birth defects, and explain the value of comparative animal approaches for

understanding mechanism of action for developmental toxicants.

- Describe the basic processes of chemical carcinogenesis, including initiation, promotion and progression, and the types of chemically-induced genetic, molecular and cellular changes that lead to cancer.
- Discuss occupational practices and regulations designed to limit chemical exposures and toxicity in the workplace, biomonitoring and the roles of occupational health professionals in workplace safety.
- Categorize toxicants with respect to chemical class, mode of action, and potency, including pesticides, heavy metals, solvents, gases, halogenated hydrocarbons, polycyclic aromatic hydrocarbons, drugs, food additives and contaminants, and toxins produced by bacteria, plants and animals.
- Identify toxicants commonly found in the home environment, discuss the design of consumer products that limit chemical exposures and explain how the Poison Control System works.
- Describe the major sources of pollution in air, water and soil, the chemicals of concern in the environment, and the distribution, fate and ecological effects of various pollutants.
- Integrate the concepts of chemical exposure and hazard as they relate to risk, distinguish between risk assessment scenarios that assume threshold vs. non-threshold responses, and discuss various risk management strategies used to limit toxicant exposures.
- Define the statutory authority governmental agencies use to control toxicant releases to the environment, exposures in the workplace, and clean-up of chemical contamination; describe the means by which exposure criteria and standards are established, and discuss the economic, political, and ethical dilemmas associated with the regulation of toxicants.

## Grading

There are 3 exams, and an optional final exam\*. Exams are worth 100 points each, for a total of 300 point for the course.

Exam I	100 pts
Exam II	100 pts
<u>Exam III</u>	<u>100 pts</u>
Total	300 pts

*Each exam is designed to be completed in 50 min.*

*\*An optional comprehensive final exam will be offered during the final examination period. This comprehensive final exam is worth 100 points, and is also designed to be completed in 50 min. Because the final exam period is scheduled for 1 hr and 50 min, there should be adequate time to take both the 3rd exam and the comprehensive optional comprehensive final exam, should you decide to do so. This optional final exam, will replace the lowest score of your other three exams, even if it is lower! Thus, turn in the optional final exam only if you feel confident that you did better on it than your previous worst exam.*

**Course Absence Policies:** It is your responsibility to notify the instructors by the end of the first week of any conflicts you may have with the exam schedule.

There will be no make-up examinations unless approved by the instructor in advance. If a test is missed because of an unexcused absence, it will not be rescheduled. Contact your instructor prior to or same day to notify him that you are unable to take the exam.

Your instructor will then set a date for a makeup exam, contingent on the student showing as soon as possible a valid medical note issued by a medical professional on the original exam date. For other reasons (car accident, death in the family etc.), arrange to speak with the instructor to explain the circumstances. Within reason we will expect to be notified prior to or the day of the exam for these instances.

If you have any concerns about the class, you may contact Dr. Kavanagh by email to arrange a meeting. If you are still not satisfied with the response that you receive, you may contact the Department Chair. You may also contact the Graduate School at G -1 Communications Bldg, by phone at (206) 543-5139 or by email at [raan@uw.edu](mailto:raan@uw.edu)

### **The University of Washington and 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 \(Links to an external site.\)](https://sph.washington.edu/students/academic-integrity-policy) (<https://sph.washington.edu/students/academic-integrity-policy>) (Links to an external site.). 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.

### **University of Washington general policy statement:**

"Admission to the University carries with it the presumption that students will conduct themselves as responsible members of the University community. As a condition of enrollment, all students assume responsibility to observe standards of conduct that will contribute to the pursuit of academic goals and to the welfare of the University community. That responsibility includes, but is not limited to:

Practicing high standards of academic and professional honesty and integrity;

1. Refraining from any conduct that would violate the rights, privileges, and property of others;
2. Refraining from any conduct that would substantially disrupt or materially interfere with University operations;
3. Refraining from any conduct that could reasonably cause harm to or endanger the health, safety, or welfare of other persons; and

4. Complying with the rules, regulations, procedures, policies, standards of conduct, and orders of the University and its schools, colleges, departments, units, and programs."

<https://www.washington.edu/admin/rules/policies/SGP/SPCH210.html> (Links to an external site.)  
(<https://www.washington.edu/admin/rules/policies/SGP/SPCH210.html>) (Links to an external site.)

For web-resources on understanding and avoiding plagiarism, please see:

<https://guides.lib.uw.edu/hsl/writer/plagiarism> (Links to an external site.)  
(<https://guides.lib.uw.edu/hsl/writer/plagiarism>) (Links to an external site.)

### **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.

### **Commitment to Multicultural Inclusion:**

The UW School of Public Health seeks to ensure all students are fully included in each course. We strive to create an environment that reflects community and mutual caring. We encourage students with concerns about classroom climate to talk to your instructor, your advisor, a member of the departmental or SPH Diversity Committee and/or the program director. [DCinfo@uw.edu](mailto:DCinfo@uw.edu) is a resource for students with classroom climate concerns.

### **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/> (Links to an external site.)  
(<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/> (Links to an external site.)  
(<https://registrar.washington.edu/students/religious-accommodations-request/>)).

**Please Note: All slide files are for your use only; they are not for distribution outside of class.**

### Lecture Schedule:

<u>Date</u>	<u>Topic</u>	<u>Reading Assignment</u>
March 29	Introduction/History of Toxicology (Kavanagh)	Chapter 1
March 31	Basic Principles of Toxicology (Kavanagh)	Chapter 2
April 2	Biological Disposition I-absorption, distribution (Kavanagh)	Chapters 5 - 7
April 5	Biological Disposition II – biotransformation (Kavanagh)	Chapters 5 - 7
April 7	Biological Disposition III – excretion (Kavanagh)	Chapters 5 - 7
April 09	Toxicity Testing Procedures (Kavanagh)	Chapter 2
April 12	Mechanisms/Factors that Modify Responses (Kavanagh)	Chapter 3
April 14	Developmental and Reproductive Toxicology (Philo?)	Chapters 10 & 21
April 16	Toxicity in the Liver (Cui)	Chapters 17
April 19	Toxicity in the Nervous System (Kavanagh)	Chapter 16
<b>April 21</b>	<b>Exam 1 (covers Mar29 – April 19)</b>	
April 23	GI Toxicology and the Microbiome (Cui)	Various, handouts

April 26	Toxicity in the Lung (Kavanagh)	Chapters 15 & 31
April 28	Genetic Toxicology (Kavanagh)	Chapter 9
April 30	Chemical Carcinogenesis (Kavanagh)	Chapter 8
May 3	Ecotoxicology (Kavanagh)	Chapter 30
May 5	Toxic Metals I (Kavanagh)	Chapter 23
May 7	Toxic metals II (Kavanagh)	Chapter 23
May 10	Occupational Toxicology (Weldon)	Chapter 34
<b>May 12</b>	<b>EXAM 2 Covers April 23 - May 10</b>	
May 14	Food Additives and Contaminants (Kavanagh)	Chapter 27
May 17	Pesticides I (Marsillach)	Chapter 22
May 19	Pesticides II (Marsillach)	Chapter 22
May 21	Natural Toxins (Philo)	Chapter 26
May 24	Drugs as Toxicants (Kavanagh)	Chapter 33
May 26	Household Products (Kavanagh)	Chapter 33

May 28	Regulatory Toxicology (Kavanagh)	Various
<b>May 31</b>	<b>Memorial Day – no class</b>	
June 2	Risk Assessment 1 (Kavanagh)	Chapter 4
June 4	Risk Assessment 2 (Kavanagh)	Chapter 4
<b>June 9</b>	<b>#Exam III – (Covers material from May 14 - June 4); plus Optional Final Exam*</b>	

*\*(There will be an optional comprehensive final exam. Note that if you turn in the final exam, it will replace the lowest score of your previous three exams, even if it is lower! Thus, turn in the final exam only if you feel confident that you did better on it than your previous worst exam).*

**#Time for Exam III and Optional Final Exam is Wednesday June 9<sup>th</sup> from 2:30 – 4:20 pm, as determined by UW Spring 2019 Final Exam Schedule**  
(<http://www.washington.edu/students/reg/S2021exam.html>)

## Course Summary:

Date	Details	Due
	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6095299">405: Exam 1</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6095299">https://canvas.uw.edu/courses/1449267/assignments/6095299</a> )	due by 12:20pm
	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6244052">Exam 1</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6244052">https://canvas.uw.edu/courses/1449267/assignments/6244052</a> )	due by 12:30pm
Wed Apr 21, 2021	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6244052">Exam 1</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6244052">https://canvas.uw.edu/courses/1449267/assignments/6244052</a> ) (1 student)	due by 12:55pm
	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6244052">Exam 1</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6244052">https://canvas.uw.edu/courses/1449267/assignments/6244052</a> ) (1 student)	due by 1:20pm
Wed May 12, 2021	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6095300">405: Exam 2</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6095300">https://canvas.uw.edu/courses/1449267/assignments/6095300</a> )	due by 12:20pm

Date	Details	Due
Wed Jun 9, 2021	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6244164">Exam 2</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6244164">https://canvas.uw.edu/courses/1449267/assignments/6244164</a> )	due by 12:20pm
	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6237129">405: Exam 3</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6237129">https://canvas.uw.edu/courses/1449267/assignments/6237129</a> )	due by 4:20pm
	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6095301">405: OPTIONAL FINAL</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6095301">https://canvas.uw.edu/courses/1449267/assignments/6095301</a> )	due by 4:20pm
	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6244189">Exam 3</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6244189">https://canvas.uw.edu/courses/1449267/assignments/6244189</a> )	due by 4:20pm
	 <a href="https://canvas.uw.edu/courses/1449267/assignments/6244208">Optional Final Exam</a> ( <a href="https://canvas.uw.edu/courses/1449267/assignments/6244208">https://canvas.uw.edu/courses/1449267/assignments/6244208</a> )	due by 4:20pm