

ENV H 514 Autumn 17: Fundamentals of Toxicology

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Autumn Quarter, 2017

Location: Roosevelt Building (4225 Roosevelt Way NE, Suite 100, Seattle, WA 98105) ([campus map](#) (<https://www.washington.edu/visit/files/2015/06/UW-Campus-Map-May-2015.pdf>))

Classes will take place on Tuesday and Thursday afternoons, for detailed time and room information, please refer to the [course schedule](#)   page.

Students are encouraged to use the [Modules](#) page for each lecture.

Course Director:

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Guest Lecturers:

Dr. Terry Kavanagh <tjkav@uw.edu (<mailto:tjkav@uw.edu>)>

Dr. Elaine Faustman <faustman@uw.edu (<mailto:faustman@uw.edu>)>

Dr. Danny Shen <ds@uw.edu (<mailto:ds@uw.edu>)>

Dr. Bhagwat Prasad <bhagwat@uw.edu (<mailto:bhagwat@uw.edu>)>

Dr. David Eaton <deaton@uw.edu (<mailto:deaton@uw.edu>)>

I. Course Overview

In this class, we will discuss fundamental cellular processes and core areas of toxicology, including dose response and toxicity testing, absorption, distribution, metabolism, and excretion of toxicants, mechanisms of toxication and detoxification, risk assessment, drug biotransformation, toxicokinetics, proteomics, toxicogenomics/toxico-epigenetics, and chemical carcinogenesis. With the information provided from this class, students will be able to have a good appreciation for how foreign chemicals, including therapeutic drugs, dietary factors, and environmental chemicals, interact with cellular pathways to affect toxicological outcomes. Guest lecturers will provide valuable input in the course to provide coverage of subject areas within their respective areas of expertise.

II. Learning Objectives

At the end of this course, the students will be able to:

- Explain dose-response theory
- Describe the process of absorption, distribution, metabolism, and excretion (ADME) of toxicants
- Describe biochemical mechanisms of toxicity
- Describe reactions and enzymes/transporters involved in biotransformation of toxicants
- Explain risk assessment
- Identify signaling transduction pathways that govern the expression and activities of xenobiotic biotransformation related genes
- Define basic principles of toxicokinetics
- Discuss toxico-genomics and toxico-epigenetics
- Discuss proteomics
- Describe basic principles of genetic toxicity, different stages and key players of chemical carcinogenesis

III. Intended Student Audience

The ENVH 514 serves as one of the core toxicology course curriculums for graduate students who are pursuing a graduate degree in the Department of Environmental and Occupational Health Sciences. It is also appropriate for senior undergraduate students or graduate students from other allied biomedical science departments, e.g. Pharmacology, School of Pharmacy, Chemistry, Molecular & Cellular Biology, Genome Sciences, Epidemiology, Fisheries etc., who are interested in gaining a basic understanding of toxicology. Prerequisites for this class include a year of undergraduate general biology, two quarters of chemistry, and/or biochemistry.

IV. Course Resources

- **Required Reading:** [Handout materials](#) will be provided for most classes and are the focus of class material.
- **Reference textbook for ENVH 514:** [Casarett & Doull's Toxicology, The Basic Science of Poisons 8th Edition \(2013\)](#) [_\(http://accesspharmacy.mhmedical.com/book.aspx?bookID=958%20\)](http://accesspharmacy.mhmedical.com/book.aspx?bookID=958%20)

A hard copy of this textbook is available at the HS library UW and reserved for the class.

This textbook is also available as an eBook and can be accessed from UW Libraries

Search <http://www.lib.washington.edu/> [_\(http://www.lib.washington.edu/\)](http://www.lib.washington.edu/) (need to type the textbook information in the search box). Direct access: [Content available: McGraw-Hill's AccessPharmacy view license terms](#) [_\(http://accesspharmacy.mhmedical.com/book.aspx?bookID=958\)](http://accesspharmacy.mhmedical.com/book.aspx?bookID=958)

If you wish to purchase a hard copy, it can be obtained from various resources such as www.amazon.com [_\(http://www.amazon.com\)](http://www.amazon.com).

Students are strongly encouraged to read the corresponding book chapters for each class.

- **Additional online resources - The Eminent Toxicologist Lectures**

<http://www.toxicology.org/education/edu/eminent.asp>

<http://www.toxicology.org/education/edu/eminent.asp>

This online course series developed by the Society of Toxicology are historically relevant and high quality presentations that are valuable resources for graduate students and the general public.

V. Grading: The final grade for this class will include the following components (total: 100 points):

- 8 Pre-class ***Poll Everywhere** Quizzes (each accounts for 3 points)
- 2 Block Exams (each accounts for 18 points)
- 1 Final Exam (40 points)

Grades will be converted into a 4.0 scale based on the calculations [here](#).

Use ***Poll Everywhere** to answer 6 questions (each accounts for 0.5 points) based on the previous two lectures (except for the 1st quiz which is based on the 1st lecture only. Note: the 12/07 quiz is based on the 11/16 and the 12/05 lectures)

- Student Log In info: <https://itconnect.uw.edu/learn/tools/canvas/canvas-help-for-instructors/assignments-grading/set-up-pe-account/>
(<https://itconnect.uw.edu/learn/tools/canvas/canvas-help-for-instructors/assignments-grading/set-up-pe-account/>)
- Responding to Polls: <https://itconnect.uw.edu/learn/tools/canvas/canvas-help-for-instructors/assignments-grading/responding-to-polls/>
(<https://itconnect.uw.edu/learn/tools/canvas/canvas-help-for-instructors/assignments-grading/responding-to-polls/>)
- Support Information: <https://itconnect.uw.edu/learn/tools/canvas/canvas-help-for-instructors/assignments-grading/pe-support-info/> (<https://itconnect.uw.edu/learn/tools/canvas/canvas-help-for-instructors/assignments-grading/pe-support-info/>)
- (<https://itconnect.uw.edu/learn/tools/canvas/canvas-help-for-instructors/assignments-grading/pe-support-info/>)
Poll Everywhere login Option 1: Use your laptop to login: <https://www.polleverywhere.com/>
(<https://www.polleverywhere.com/>) (choose **UW Single logon authentication option**)
- Poll Everywhere login Option 2 (recommended): Download Poll Everywhere app for your smart phone and login using UW email address (choose **UW Single logon authentication option**)
- Device access: If you are unable to bring a device to every class you can visit the **STF Equipment Loan Program**:
<http://www.cte.uw.edu/STFEquipment> (<http://www.cte.uw.edu/STFEquipment>)

VI. Absence Policy

While attendance at all discussion sessions is required, we understand that extenuating circumstances may arise. Valid excuses for missing class include a) participation in an official school activity (e.g., athletic event) or b) illness with valid doctor's note. All other situations will be handled on a case-by-case basis. If the

absence is planned, a written notice (via email) must be submitted to the instructors no less than one week prior to the discussion session (earlier is better). If the absence is unforeseen, a written explanation must be submitted within one week of returning to school.

VII. 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 \(mailto:uwdrs@uw.edu\)](mailto:uwdrs@uw.edu) or visit the website: <http://depts.washington.edu/uwdrs/> (<http://depts.washington.edu/uwdrs/>). 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.

VIII. 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. In addition to earning a grade of zero on the assignment or exam, all cases will be referred to the University Disciplinary Committee. For more information, see the [University of Washington Community Standards and Student Conduct website](https://www.washington.edu/cssc/) (<https://www.washington.edu/cssc/>).

IX. Diversity and 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. Diverse backgrounds, embodiments, and experiences are essential to the critical thinking endeavor at the heart of university education. Therefore, I expect you to follow the UW Student Conduct Code in your interactions with your colleagues and me in this course by respecting the many social and cultural differences among us, which may include, but are not limited to: age, cultural background, disability, ethnicity, family status, gender identity and presentation, citizenship and immigration status, national origin, race, religious and political beliefs, sex, sexual orientation, socioeconomic status, and veteran status. Please talk with me right away if you experience disrespect in this class, and I will work to address it in an educational manner. DCinfo@uw.edu

<mailto:DCinfo@uw.edu> is a resource for students with classroom climate concerns.

Course Summary:

| Date | Details |
|------------------|---|
| Thu Oct 5, 2017 |  Additional Resources for Lecture 13 (Eminent Toxicologist Lecture series) Cheryl Walker due by 12:30pm (https://canvas.uw.edu/courses/1116974/assignments/3880963) |
| |  Additional Resources for Lecture 1 (Milestones of Toxicology Poster) due by 3:30pm (https://canvas.uw.edu/courses/1116974/assignments/3873015) |
| Mon Oct 9, 2017 |  Additional Resources for Lecture 1 (Eminent Toxicologist Lecture series) due by 5pm (https://canvas.uw.edu/courses/1116974/assignments/3832843) |
| Tue Oct 10, 2017 |  Additional resources for Lecture 2 (Eminent Toxicologist series) due by 4:30pm (https://canvas.uw.edu/courses/1116974/assignments/3832885) |
| Tue Oct 24, 2017 |  BLOCK I EXAM due by 11:59pm (https://canvas.uw.edu/courses/1116974/assignments/3933586) |
| Thu Nov 2, 2017 |  Additional Resources for Risk Assessment, animal testing, and alternative models (Eminent Toxicologist Lecture series) due by 4:30pm (https://canvas.uw.edu/courses/1116974/assignments/3933683) |
| |  Week 5 Quiz: Risk Assessment & ADME II due by 5:20pm (https://canvas.uw.edu/courses/1116974/assignments/3936148) |
| Tue Nov 21, 2017 |  BLOCK II EXAM due by 5:20pm (https://canvas.uw.edu/courses/1116974/assignments/3959366) |
| Tue Nov 28, 2017 |  Additional Resources for Lecture 13 (Eminent Toxicologist Lecture series) Ken Ramos due by 4:30pm (https://canvas.uw.edu/courses/1116974/assignments/3954732) |
| Tue Dec 5, 2017 |  Additional Resources for Lecture 14 (Eminent Toxicologist Lecture series) Carcinogenesis due by 4:30pm (https://canvas.uw.edu/courses/1116974/assignments/3954744) |
| |  Additional Resources for Lecture 8. ADME II - Transporters Review (https://canvas.uw.edu/courses/1116974/assignments/3938489) |
| |  Week 1 Quiz (History of Toxicology) (https://canvas.uw.edu/courses/1116974/assignments/3915924) |

 [**Week 2 Quiz \(Principles & Mechanisms I\)**](https://canvas.uw.edu/courses/1116974/assignments/3924128)
(<https://canvas.uw.edu/courses/1116974/assignments/3924128>)

 [**Week 3 Quiz \(Mechanisms I & III\)**](https://canvas.uw.edu/courses/1116974/assignments/3928878)
(<https://canvas.uw.edu/courses/1116974/assignments/3928878>)

 [**Week 4 Quiz ADME I**](https://canvas.uw.edu/courses/1116974/assignments/3936115)
(<https://canvas.uw.edu/courses/1116974/assignments/3936115>)

 [**Week 5 Quiz Risk Assessment and ADME II**](https://canvas.uw.edu/courses/1116974/assignments/3941889)
(<https://canvas.uw.edu/courses/1116974/assignments/3941889>)

 [**Week 6 Quiz Biotransformation I and II**](https://canvas.uw.edu/courses/1116974/assignments/3948446)
(<https://canvas.uw.edu/courses/1116974/assignments/3948446>)

 [**Week 6 Quiz Toxicokinetics and Biotransformation III**](https://canvas.uw.edu/courses/1116974/assignments/3954733)
(<https://canvas.uw.edu/courses/1116974/assignments/3954733>)
