

# Course Syllabus

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## ENVH 515 –ORGAN SYSTEMS TOXICOLOGY and PATHOLOGY

Winter Quarter, 2017 - MWF 2:30-3:20, Room E212, HSB

Instructor: Dr. Terry Kavanagh; 206-685-8479 ([tjkav@uw.edu](mailto:tjkav@uw.edu) (<mailto:tjkav@u.washington.edu>))

**Appointments with Dr. Kavanagh by arrangement.**

ENVH 515 is the second course of a three-course sequence, with ENVH 514 (Dr. Zhengui Xia) and ENVH 516 (Dr. Lucio Costa). The overall goal is for students to gain a basic working knowledge of how chemicals interact with biological systems to produce adverse effects, i.e., the science of toxicology. The second quarter of this series is organized with sections pertaining to target organs and/or organ systems. Thus, the second quarter of this series will concentrate on organ toxicology and pathology while the first quarter concentrated on basic concepts and mechanisms of toxicology and the third quarter will concentrate on specific agents. Guest lecturers are a valuable asset to the course in general and will assist in providing coverage of subject areas within their respective areas of expertise.

**Learning objectives:** At the end of this course, the student will be able to

- 1) Describe histological and morphometry methods used by toxicological pathologists to evaluate and quantify toxicant induced tissue injury
- 2) Describe the anatomy and function of the liver, and have an understanding of commonly used biomarkers of toxicant induced liver injury
- 3) Describe the major cell types in the nervous system, the anatomy of blood brain barrier and the effects of toxicant exposure on nervous system development and function
- 4) Describe the major cell types and mediators involved in the immune system and how to assess their function in the context of toxic chemical exposure
- 5) Describe the response of tissues to toxicant induced injury
- 6) Discuss the effects of toxicant exposure toward the skin and sensory organs
- 7) Describe the anatomy and function of the kidney, and have an understanding of commonly used biomarkers of toxicant induced kidney injury
- 8) Describe critical cell types, organs and hormones in the endocrine system, and have knowledge of the effects of endocrine disrupting chemicals
- 9) Define the models used to evaluate teratogenic potential, understand the basis for selective windows of susceptibility for developmental toxicants, describe the cellular anatomy of reproductive tissues and the

effects of toxicants on their function

10) Describe the humoral and cellular components of the blood and bone marrow, and discuss common endpoints used to evaluate toxicant effects on the blood and bone marrow

11) Describe the anatomy and function of the cardiovascular system, and define of the process of atherogenesis and the role that nutrition, chemical exposure and oxidative stress play in its pathophysiology

12) Describe the anatomy and function of the respiratory system, and the effects of inhaled toxicants on the lung

13) Describe tests commonly used to evaluate behavioral toxicants, and the effects of neurotoxic chemicals on behavior

**Intended Student Audience:** The ENVH 514/515/516 course sequence serves as the core of the toxicology program for Toxicology graduate students in the Department of Environmental and Occupational Health Sciences. Graduate students from other allied biomedical science departments, e.g., Epidemiology, Medicinal Chemistry, Pharmaceutics, Chemistry, Molecular & Cellular Biology, have also participated in the course on a regular basis. Prerequisites for this class include a year of undergraduate general biology and two quarters of organic chemistry. Previous background or concurrent registration in mammalian physiology is strongly recommended.

**Required Reading:** The text for ENVH 515 is: Casarett and Doull's Toxicology: the Basic Science of Poisons; CD Klaassen, ed.; 8th Edition (2013), and is available at the Health Sciences Branch of the University Bookstore. ***A copy of this textbook is available electronically at UW:***

<http://accesspharmacy.mhmedical.com/book.aspx?bookID=958>

[\(http://accesspharmacy.mhmedical.com/book.aspx?bookID=958\)](http://accesspharmacy.mhmedical.com/book.aspx?bookID=958)

Additional handout materials will be provided for most classes and are required reading.

**Grading:** The final grade for this class will be based on accumulated scores from three exams (each worth 30% of the final grade for a total of 90%), plus 10% for class participation.

**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 instructors prior to or same day to notify them 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 instructors 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 phone or 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 \(mailto:raan@uw.edu\)](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 \(http://sph.washington.edu/students/academicintegrity/\)](http://sph.washington.edu/students/academicintegrity/). 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 academic 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 academic community. That responsibility includes, but is not limited to: practicing high standards of academic and professional honesty and integrity.” [Reference: WAC 478-120-020 Standards of Conduct (2a),<http://www.washington.edu/students/handbook/conduct.html#020>]

For web-resources on understanding and avoiding plagiarism, go to:

<http://courses.washington.edu/hsstudev/studev/plagiarism.htm>  
(<http://courses.washington.edu/hsstudev/studev/plagiarism.htm>)

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### **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 [disability.uw.edu](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.

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

### **DRAFT Lecture and Exam Schedule:**

<u>Date</u>	<u>Topic</u>	<u>Lecturer</u>	<u>Reading</u>
01/03/18	Cell & Tissue Response to Injury	Kavanagh	Handout
01/05/18	Immunotoxicology I	Kavanagh	Chapter 12
01/08/18	Immunotoxicology II	Kavanagh	Chapter 12
01/10/18	Immunotoxicology III	Kavanagh	Chapter 12
01/12/18	Histopathology/Morphometry	Frevert	Handout
01/15/18	NO CLASS – Martin Luther King Day	Holiday	
01/17/18	Toxicology of the Liver I	Eaton	Chapter 13
01/19/18	Toxicology of the Liver II	Eaton	Chapter 13
01/22/18	Toxicology of the Liver III	Kavanagh	Chapter 13
01/24/18	<b>EXAM I</b>		
	Covers: lectures 01/03 through 01/22		
01/26/18	Toxicology of the GI system	Kavanagh	Handout

01/29/18	Blood/Bone Marrow Toxicology	Kavanagh	Chapter 11
01/31/18	Toxicology of the Sensory Systems	Krejsa	Chapter 17
02/02/18	Skin Toxicology	Krejsa	Chapter 19
02/05/18	Toxicology of the Kidney I	Kelly	Chapter 14
02/07/18	Toxicology of the Kidney II	Kelly	Chapter 14
02/09/18	Behavioral Toxicology	Cole	Chapter 16
02/12/18	Neurotoxicology I	Costa	Chapter 16
02/14/18	Neurotoxicology II	Costa	Chapter 16
02/16/18	<b>Exam II</b>		
	Covers: lectures 1/26 through 2/16		
02/19/18	NO CLASS – Presidents' Day Holiday		
02/21/18	Cardiovascular Toxicology I	Rosenfeld/Kavanagh	Chapter 18
02/23/18	Cardiovascular Toxicology II	Rosenfeld	Chapter 18
02/26/18	Developmental & Repro Toxicology I	Faustman	Chapters 10, 20
02/28/18	Developmental & Repro Toxicology II	Faustman	Chapters 10, 20
03/02/18	Developmental & Repro Toxicology III	Faustman	Chapters 10, 20
03/05/18	Toxicology of the Respiratory System I	Kavanagh	Chapter 15
03/07/18	Toxicology of the Respiratory System II	Kavanagh	Chapter 15
03/09/18	Toxicology of the Respiratory System III	Kavanagh	Chapter 15
Finals Week	<b>EXAM III</b> Tuesday, Dec. 12, 2017; HST E212		

Covers: lectures 02/21 through 03/09

## Course Summary:

**Date**

**Details**

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