

ENVH 515 – ORGAN SYSTEM TOXICOLOGY

COURSE SYLLABUS

Winter Quarter, 2016 - MWF 2:30-3:20, Room E212 Health Sciences

Instructor: Dr. Terry Kavanagh; 206-685-8479 (tjkav@uw.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 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. ***Also, a copy of the 7th edition of this textbook is available electronically at UW:***

<http://www.r2library.com/Resource/Title/0071470514> (Links to an external site.)

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

Grading: The final grade for this class will be based on an accumulated scores from three mid-term exams (each worth 25% of the final grade), and a final exam (worth 25% of the final grade).

Lecture and Exam Schedule:

<u>Date</u>	<u>Topic</u>	<u>Lecturer</u>	<u>Reading</u>
1/4/16	Cell & Tissue Response to Injury	Kavanagh	Handout
1/6/16	Histopathology/Morphometry	Frevert	Handout
1/8/16	Blood/Bone Marrow Toxicology	Kavanagh	Chapter 11
1/11/16	Immunotoxicology I	Kavanagh	Chapter 12
1/13/16	Immunotoxicology II	Kavanagh	Chapter 12
1/15/16	Immunotoxicology III	Kavanagh	Chapter 12
1/18/16	NO CLASS – Martin Luther King Day	Holiday	
1/20/16	MID-TERM EXAM I Covers: lectures 1/04 through 1/15		
1/22/16	Toxicology of the Kidney I	Kavanagh	Chapter 14
1/25/16	Toxicology of the Kidney II	Kelly	Chapter 14
1/27/16	Toxicology of the GI system	Kavanagh	Handout
1/29/16	Toxicology of the Liver I	Kavanagh	Chapter13
2/01/16	Toxicology of the Liver II	Schaupp	Chapter 13
2/03/16	Toxicology of the Liver III	Schaupp	Chapter 13
2/05/16	MID-TERM Exam II Covers: lectures 1/22 through 2/03		
2/08/16	Skin Toxicology	Krejsa	Chapter 19
2/10/16	Behavioral Toxicology	Cole	Chapter 16
2/12/16	Neurotoxicology I	Costa	Chapter 16
2/15/16	NO CLASS – Presidents' Day Holiday		
2/17/16	Neurotoxicology II	Costa	Chapter 16
2/19/16	Cardiovascular Toxicology I	Rosenfeld	Chapter 18
2/22/16	Cardiovascular Toxicology II	Rosenfeld/Kavanagh	Chapter 18
2/24/16	Toxicology of the Sensory Systems	Krejsa	Chapter 17
2/26/16	MID-TERM Exam III Covers: lectures 2/08 through 2/24		

2/29/16	Toxicology of the Respiratory System I	Scoville	Chapter 15
3/02/16	Toxicology of the Respiratory System II	Scoville	Chapter 15
3/04/16	Toxicology of the Respiratory System III	Kavanagh	Chapter 15
3/07/16	Developmental & Repro Toxicology I	Faustman	Chapters 10, 20
3/09/16	Developmental & Repro Toxicology II	Faustman	Chapters 10, 20
3/11/16	Developmental & Repro Toxicology III	Faustman	Chapters 10, 20
3/15/16	FINAL EXAM 2:30 - 4:20 p.m. HST_____		

Covers: lectures 2/29 through 3/11

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