

ENVH 514 - ENVIRONMENTAL AND OCCUPATIONAL TOXICOLOGY I
COUSE SYLLABUS

Autumn Quarter, 2009 - MWF 11:30-12:20, HSB **T474**

Course Director:

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Guest lecturers:

Dr. Terry Kavanagh <tjkav@u.washington.edu>
Dr. Dan Luchtel <dluchtel@u.washington.edu>,
Dr. Edward J. Kelly <edkelly@u.washington.edu>
Dr. Elaine Faustman <faustman@u.washington.edu>,
Dr. Theo Bammler <tbammler@u.washington.edu>,
Dr. David Eaton <deaton@u.washington.edu>,
Dr. Dave Goodlett <goodlett@u.washington.edu>
Dr. Cecile Krejsa <cmkrejsa@earthlink.net. >
Dr. Katie Sprugel <ksprugel@amgen.com >

Course Overview: In this class, students will explore the mechanisms and fate of chemical interaction with biological systems. With the information gathered from this class, students will derive an enhanced appreciation for how foreign chemicals, including pharmaceuticals and environmental agents, interact with cellular pathways to effect toxicological insult. Guest lecturers will provide valuable assistance in the course to provide coverage of subject areas within their respective areas of expertise.

ENVH 514 is the first quarter of a 3-quarter course series. None of the individual courses are intended as stand-alone courses. Together, the 3-quarter sequence integrates core subject areas pertaining to environmental and occupational toxicology. In ENVH 514 we will discuss **fundamental cellular processes and core areas of toxicology**. The second quarter (ENVH 515) of the course sequence focuses primarily on **organ system toxicology** and the emphasis of the third quarter (ENVH 516) is on **specific classes of toxicological agents (agent specific toxicology)**.

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

- 1) explain dose-response theory;
- 2) describe absorption & distribution process of toxicants
- 3) describe reactions and enzymes involved in biotransformation
- 4) describe basic principles of genetic toxicology
- 5) identify signal transduction pathways
- 6) explain risk assessment
- 7) describe biochemical mechanisms of toxicity

- 8) define basic principles of toxicokinetics
- 9) describe biotech/regulatory Toxicology
- 10) define cell death & apoptosis
- 11) discuss toxicogenomics
- 12) discuss proteomics
- 13) discuss metabolomics
- 14) discuss ecogenetics/Env. Epidemiology
- 15) describe chemical contribution of carcinogenesis; different stages of carcinogenesis; key molecular players in carcinogenesis

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, Chemistry, Molecular & Cellular Biology, also participate in the course on a regular basis. Prerequisites for this class include a year of undergraduate general biology, two quarters of organic chemistry, and two quarters of graduate level biochemistry, the second quarter of which may be taken concurrently. Previous background or concurrent registration in mammalian physiology is strongly recommended.

Required Reading: The text for ENVH 514 is: Casarett and Doull's Toxicology: the Basic Science of Poisons; CD Klaassen, ed.; 7th Edition (2007), and is available at the Health Sciences Branch of the University Bookstore. The same text also is used in the 515 and 516 sections of this course. *A copy of this textbook is available electronically at UW:*

http://www.knovel.com/web/portal/browse/display?_EXT_KNOVEL_DISPLAY_bookid=2355

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

Grading: The final grade for this class will be compiled from 2 in-class exams and one take-home exam, each accounts for 1/3 of the final grade.

Date	Topics	Reading	Instructor
Sept. 30	Course Overview; Introduction; Dose-Response	Chapter 1, 2	Xia
Oct. 2	Absorption and distribution Processes: oral, skin	Chapter 5	Xia
Oct. 5	Lung - Structure/Function & Absorption/Inhalation	Chapter 5	Luchtel
Oct. 7	Distribution and Excretion	Chapter 5	Xia
Oct. 9	Animal toxicity tests and variation in toxic response	Chapter 2	Xia
Oct. 12	Risk Assessment I	Chapter 4	Faustman
Oct. 14	Risk Assessment I	Chapter 4	Faustman
Oct. 16	Toxicokinetics I	Chapter 7	Kelly
Oct. 19	Toxicokinetics II	Chapter 7	Kelly
Oct. 21	In class exam		
Oct. 23	Biotransformation I	Chapter 6	Kavanagh
Oct. 26	Biotransformation II	Chapter 6	Kavanagh
Oct. 28	Mechanisms of Toxicity I, repair	Chapter 3	Kavanagh
Oct. 30	Mechanisms of Toxicity I, repair	Chapter 3	Kavanagh
Nov. 2	Genetic Toxicology and genetic toxicity tests	Chapter 9	Kavanagh
Nov. 4	Cell death & Apoptosis	Handouts	Xia
Nov. 6	Cell death & Apoptosis	Handouts	Xia
Nov. 9	Signal transduction	Handouts	Xia
Nov. 11	HOLIDAY		
Nov. 13	Signal transduction	Handouts	Xia
Nov. 16	Apoptosis and signaling in Toxicology	Handouts	Xia
Nov. 18	In class exam		
Nov. 20	Carcinogenesis I	Chapter 8	Xia
Nov. 23	Carcinogenesis II	Chapter 8	Xia
Nov. 25	Carcinogenesis III	Chapter 8	Xia
Nov. 27	HOLIDAY		
Nov. 30	Ecogenetics/Env. Epidemiology	Handouts	Eaton
Dec. 2	Toxicogenomics	Handouts	Bammler
Dec. 4	Proteomics	Handouts	Goodlett
Dec. 7	Metabonomics	Handouts	Kavanagh
Dec. 9	Biotech/Regulatory Toxicology I	Handouts	Krejsa
Dec. 11	Biotech/Regulatory Toxicology II	Handouts	Sprugel
Dec. 18	Take home final exam due		