

# ENVIRONMENTAL TOXICOLOGY (EHSC 4490/6490)

Department of Environmental Health Science  
Environmental Health Science Building  
University of Georgia  
Fall Semester, 2009

**Instructor:** Mary Alice Smith, Ph.D.  
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**Phone:** (706) 542-1599  
**Office Hours:** Tuesday 2:00-4:30; Wednesday 3:00-5:00, or by appointment

**Teaching Assistant:** No official teaching assistant was assigned, but my graduate students will be happy to assist you, when they have time. You can usually find them in Rm 200 of the Environmental Health Science Building.

**Description:** A study of the extent and significance of toxic agents in the environment and the biological processes which determine their behavior, fate, and ultimate effect on human health.

**Credit:** 3 hours

**Prerequisite:** CHEM 2211, 2211L or permission of department

**Meeting Time:** Tuesday/Thursday 11:00-12:15

**Meeting Location:** Room 101, Environmental Health Science Bldg

**Required Text:** *Cassarett and Doull's Essentials of Toxicology*, C.D. Klassen and J.B. Watkins III, editors. 2003. Publisher: The McGraw-Hill Companies, Inc.

## Course Policies:

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

**Attendance:** Regular attendance is expected of all students at all classroom sessions. In the event of your absence, you are held responsible for all material covered or assigned during class. Make-up exams will not be given, but a comprehensive final exam will be used for the missed exam.

## Learning Objectives:

This course is intended for senior level undergraduate and graduate students with an interest in environmental toxicology. By the end of the course, the students will be able to:

- Describe the basic principle of the dose response curve, identify different types of dose response curves and be able to construct a dose response curve from data.
- Describe how absorption, distribution, biotransformation and excretion can impact the toxicity of an agent after a person has been exposed.
- Describe the basic four elements of risk assessment (hazard identification, exposure assessment, hazard characterization, and risk characterization).
- Discuss the significance, reliability and interpretation of risk assessments.
- Explain how a toxicant can disrupt the normal functions of 1) a lipid membrane, 2) gene expression, or 3) repair or disrepair of cellular molecules.
- Discuss the 3 main steps in carcinogenesis and the recent concerns of why these may not adequately describe the process of carcinogenesis.
- Describe the main characteristic(s) of each organ system that makes them vulnerable to toxicants.
- Critically evaluate chemical and microbial risk assessments.
- Participate in group projects to conduct risk assessments of chemicals or microbial pathogens.

**Assignments:** Each topic has a reading assignment shown on the syllabus. You are expected to have read the assignment BEFORE class and to submit by eLearning at least 1 question that needs more explanation in class. Handouts and problem sets will be given out during class at various times during the semester. You are expected to read the handouts and to work the problems and turn in the answers to the problems by the due date.

**Graduate Students:** Graduate students will participate in a 1 hr seminar each week to discuss journal articles relevant to the field of environmental toxicology. Meeting times will be arranged according to student's schedules.

**Grades:** There will be 3 in-class exams and a final exam. There will also be a risk assessment project worked in groups. The grading will be as follows:

Exam 1	=	20%	Final Exam	=	20%
Exam 2	=	20%	Project	=	15%
Exam 3	=	20%	Homework	=	5%

All academic work must meet the standards contained in "A Culture of Honesty." Students are responsible for informing themselves about those standards before performing any academic work.

### 1. General Principles of Toxicology

Date	Topic	Assignments
Aug 18, T	Introduction to Toxicology	Chapt 1
Aug 20, Th	Principles of Toxicology	Chapt 2
Aug 25, T	Absorption and Distribution of Toxicants	Chapt 5, 59-67
Aug 27, Th	Storage and Excretion of Toxicants	Chapt 5, 67-70
Sept 1, T	Biotransformation of Toxic Chemicals-Phase I	Chapt 6, 71-88
Sept 3, Th	Biotransformation of Toxic Chemicals-Phase II (Guest Lecture)	Chapt 6, 88-97
Sept 8, T	Mechanisms of Toxic Effects	Chapt 3
Sept 10, Th	Factors Modifying Metabolism and Toxicokinetics	Chapt 7
Sept 15, T	Mutagenesis	Chapt 9
<b>Sept 17, Th</b>	<b>Exam 1</b>	

### 2. Assessment of Toxicology

Sept 22, T	Carcinogenesis	Chapt 8
Sept 24, Th	Overview of risk assessment projects	Handouts
Sept 29, T	Risk Assessment – Hazard Evaluation and Exposure Assessment	Chapt 4, pp46-50
Oct 1, Th	Risk Assessment – Toxicity Assessment and Risk Characterization	Chapt 4, pp50-56

### 3. Organ Specific Toxicology

Oct 6, T	Reproductive and Endocrine Toxicology	Chapt 20 & 21
Oct 8, Th	Midterm of semester	
Oct 8, Th	Developmental Toxicology	Chapt 10
<b>Oct 13, T</b>	<b>Exam 2</b>	
Oct 15, Th	<b>Group Assignment – Work on Risk Assessment Project</b>	
Oct 20, T	Liver Toxicology	Chapt 13
Oct 22, Th	Renal Toxicology and Immunotoxicology	Chapt 14 & 12

Oct 27, T	Neurotoxicology	Chapt 16
Oct 29, T	Inhalation Toxicology and Dermatoxicology	Chapt 15 and 19
Oct 30, F	Fall Break	
Nov 3, T	Pesticides	Chapt 22

#### 4. Classes of Toxic Chemicals

Nov 5, Th	Volatile Organic Compounds and Solvents	Chapt 24
Nov 10, T	Metals and Radionucleotides	Chapt 23 & 25
<b>Nov 12, Th</b>	<b>Exam 3</b>	
Nov 17, T	'Natural' Toxins	Chapt 26 & 27
<b>Nov 19, Th</b>	<b>Ecotoxicology-Risk Assessment Draft Due</b>	Chapt 29
Nov 23-27	Thanksgiving Break	
Dec 1, T	Food Toxicology	Chapt 30
*Dec 3, Th	Toxic Chemicals in the air, soil and water (Last Tox class)	Chapt 28
Dec 8, T	<b>Risk Assessment Projects Due (Friday class schedule)</b>	
Dec 9, W	Reading Day	
<b>Dec 11, F</b> <b>Final Exam</b>	12:00 – 3:00 pm. Will be in two parts. First session will cover the last section of material and is required of all students ( <b>Exam 4</b> ); the second section (comprehensive) will be optional and can be used to drop a lower grade or is a makeup exam for any exam missed.	

\*December 3 will be the last class day for Environmental Toxicology. A Friday schedule will be run on Tuesday December 8<sup>th</sup>.