DEPARTMENT: Environmental Health

COURSE NUMBER: EH 590R   SECTION NUMBER: 004   SEMESTER: Spring 2015

CREDIT HOURS: 1

COURSE TITLE: Foundations in Molecular Toxicology

COURSE LOCATION: TBA

SUGGESTED READING: Casarett and Doull’s *Toxicology: The Basic Science of Poisons*

INSTRUCTOR:
W. Michael Caudle, PhD
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OFFICE HOURS: By appointment

BRIEF COURSE DESCRIPTION
Mondays 1:00-2:50p; January 12-February 23
The goal of this course is to elaborate students’ understanding of the interaction between different environmental chemicals and specific organ systems of the human body, focusing on appreciation of the explicit cellular and molecular mechanisms that underlie the toxicity. This knowledge will be supplemented through outside readings and class discussions that serve to support the students’ understanding of the material and provide them with a real world perspective of molecular toxicology.

LIST SCHOOL LEVEL, DEPARTMENT, AND/ OR PROGRAM COMPETENCIES

Understand and describe biological and chemical factors and mechanisms that affect the health of individuals, communities, and populations.
LIST LEARNING OBJECTIVES ASSOCIATED WITH THE COMPETENCIES

- Be able to describe the molecular pathways associated with general mechanisms of toxicity
- Be able to describe and apply specific research methods to evaluate toxicity
- Be able to describe and apply the molecular mechanisms involved in liver metabolism and hepatotoxicity
- Be able to describe and apply the molecular mechanisms involved in the normal function of the central nervous system and how specific toxicants alter these mechanisms
- Be able to describe and apply the specific molecular sites of action and physiological effects of pesticide exposure
- Be able to describe and apply the molecular mechanisms involved in respiratory toxicology
- Be able to describe and apply the molecular targets involved in endocrine disruption

EVALUATION

Your grade in this class will be based upon weekly written assignments and class participation

Assignment 1: Mechanisms of Toxicology/Methods in Toxicology  
Assignment 2: Molecular mechanisms of atrazine
Assignment 3: PCBs and the aryl hydrocarbon receptor
Assignment 4: Toxicological effects of pyrethroid insecticides
Assignment 5: Effects of new generation pesticides
Assignment 6: Toxicity of nanoparticles
Assignment 7: Molecular mechanisms of DDT

Each assignment will involve interaction with outside readings related to each lecture topic. Students will work with the lecture material as well as the outside reading in order to appraise specific questions related to each topic that will serve to enrich students’ understanding of the material and relate to relevant human health and toxicological situations. Students will then draw upon and convey this information during class discussion. Students will be evaluated on their understanding of the material and their ability to integrate and apply it to human and public health settings.

ACADEMIC HONOR CODE

The RSPH requires that all material submitted by a student in fulfilling his or her academic course of study must be the original work of the student.
Class Schedule

**Week 1**  
Jan 12  
(Molecular mechanisms of toxicity/Research methods in toxicology (Caudle)

**Week 2**  
Jan 19  
(Martin Luther King Jr. Holiday (No Class))  
Assignment #1 due: Aldehyde dehydrogenase and Parkinson disease

**Week 3**  
Jan 26  
(Mechanisms of liver enzyme induction and hepatotoxicity (Morgan))  
Assignment #2 due: Molecular mechanisms of atrazine

**Week 4**  
Feb 2  
(The action potential and neurotransmission (Caudle))  
Assignment #3 due: Interaction of PCBs with the aryl hydrocarbon receptor

**Week 5**  
Feb 9  
(Molecular mechanisms of pesticide exposure (Caudle))  
Assignment #4 due: Toxicological effects of pyrethroid insecticides

**Week 6**  
Feb 16  
(Cellular and molecular mechanisms of respiratory toxicology (Jordan))  
Assignment #5 due: Toxicological effects of new generation pesticides

**Week 7**  
Feb 23  
(Mechanisms of endocrine disruption (Caudle))  
Assignment #6 due: Toxicological impact of nanoparticles

**Week 8**  
Mar 2  
(No Class)  
Assignment #7 due: Molecular mechanisms of DDT