

**Division of Occupational and Environmental Health  
Graduate School of Public Health  
College of Health and Human Services  
San Diego State University**

**MECHANISMS OF ENVIRONMENTAL TOXICANTS (PH637)**

*Fall 2006, Schedule No. 25955*

**TIME/ROOMS:** *Fridays, HT 10 (see syllabus)*

**INSTRUCTORS:** *Teresa Dodd-Butera; 619-995-4057; [tdoddbutera@gmail.com](mailto:tdoddbutera@gmail.com)*

*Yvonne Will; 858-622-7544, [yvonne.will@pfizer.com](mailto:yvonne.will@pfizer.com)*

**OFFICE HOURS:** *Teresa Dodd-Butera; M/W 12:30-1:30pm; HT 104*

**COURSE DESCRIPTION:** *Lectures, readings, laboratory experiments and demonstrations teach general approaches to the study of mechanisms and illustrate some of the many important mammalian responses to environmental agents. This course is designed for students with good backgrounds in the basic sciences and an interest in understanding underlying effects of exposure to pesticides, solvents, drugs and other potentially toxic chemicals in the environment. Examples of topics to be discussed:*

1. *Model systems used to study mechanisms: applications and relevance to human health.*
2. *Bioactivation to reactive intermediates; enzyme inducers and inhibitors (e.g., PCBs, piperonyl butoxide) and how they mediate toxicity.*
3. *Disruptors of cell metabolism (e.g., cyanide, hydrogen sulfide, oxygen radicals).*
4. *Receptor-mediated toxicity (hormone disruption, peroxisome proliferators, etc)*
5. *Mutagenesis and carcinogenesis (genotoxic and nongenotoxic mechanisms).*
6. *Target organ toxicity mechanisms*

**COMPETENCIES EXPECTED:** *Students who successfully complete this course should be able to:*

1. *Explain why studying and understanding mechanisms of toxicity is important for improving public health.*
2. *Describe selected important mechanisms of toxicity discussed in class.*
3. *Research, interpret, and synthesize scientific literature describing the latest research on a mechanism of toxicity.*
4. *Understand and perform basic laboratory techniques used to study chemical mechanisms of action.*
5. *Analyze and interpret data and communicate major findings of laboratory experiments focusing on understanding chemical mechanisms of action*

**REQUIRED TEXTS, ADDITIONAL READINGS, and LAB SYLLABUS:** *(1) Boelsterli, U.R., Mechanistic Toxicology, Taylor & Francis, 2003 available at Aztec Shops. (2) Laboratory syllabus, lecture PowerPoints, on-line assignments, and other classroom material will be posted on Blackboard. (3) A bound laboratory notebook is required for keeping experimental records in the lab portion of the course.*

**ASSIGNMENTS AND GRADING:** *Laboratory write ups (45%); Literature reviews (20%); final class presentation (25%); Regular attendance and participation (10%).*

**PREREQUISITES:** *A good background in basic biology, inorganic and organic chemistry. Additional lecture and laboratory courses in biochemistry, cell/molecular biology, genetics, pharmacology/toxicology, histology/pathology, and physiology make this course easier and more meaningful but are not absolutely essential. If you have no toxicology background and are not concurrently enrolled in PH638A, some additional basic background reading may be recommended for reading during the first few weeks.*

**Division of Occupational and Environmental Health**  
**Graduate School of Public Health**  
**College of Health and Human Services**  
**San Diego State University**

**MECHANISMS OF ENVIRONMENTAL TOXICANTS (PH 637)**

**2006 SCHEDULE**

*Unless otherwise indicated, reading is in "Mechanistic Toxicology" by Urs A. Boelsterli.*

<b>Week</b>	<b>Date</b>	<b>Topics</b>	<b>Required reading and other assignments</b>
1 TDB	9/1; 1-4 pm	<b>Introduction and Course Overview</b>  * Students who have not had the SDSU lab health and safety orientation must complete this immediately after lab on 8/31 (approx 1 hr) or schedule with Walter Hayhow to complete before 9/8.	
2 Will	Sept 8 <sup>th</sup> ; 8am- 5:30 pm	Mechanisms Involving Disrupted Mitochondrial Function: Disrupted Cellular Energy : Microsome isolation and protein assay. Lab: Protein assay	Chapters 15 and 7
3 Will	Sept 29 <sup>th</sup> 8am- 5:30 pm	Altered Microsomal Function: Bioactivation of Xenobiotics to Reactive Metabolites Lab: P450	Chapters 4 and 5  ***Lab Write Up Due**
4	Oct 12 Thur 8am- 5:30 pm	<b>SCSOT Meeting</b>	Presentation topic due

<i>Week</i>	<i>Date</i>	<i>Topics</i>	<i>Required reading and other assignments</i>
5 TDB	Oct 20; 8am- 5:30 pm	<b>Immunotoxicology: Immune Mechanisms and Cytokine-Mediated Toxicity</b> LeighAnn Burn; Pfizer;	Chapters 10,11 *** Lab Write Up Due**
6 TDB	Nov 10; 8am- 5:30 pm	<b>EM facility tour (tentative); Topics: Histopathology, Nuclear receptor-mediated toxicity, DNA, and Developmental Toxicology (and other selected topics)</b> <b>Journal Club Presentations</b>	Chapters 8, 9,13; ***Journal Reviews due
7 TDB	Nov 17 <sup>th</sup> 8am- 5:30 pm	<b>Carcinogenesis</b> Lab: Comet assay (Scott Steinert lab)	***To be posted on Blackboard***
8 TDB	Dec 1st <sup>th</sup> ; 8am- 5:30 pm	Final Mechanisms Presentation	Comet Assay Lab Write Up Due***
9 Will	Dec 8th <sup>th</sup> 8am- 5:30 pm	<b>Mitochondrial Isolation and Respiration</b>	

Final write-up due during Finals Week, to be determined by Yvonne Will