

Principles of Nanobiological Interactions & Nanotoxicology

Environmental Health Sciences (EHS) 280

Instructor: Professor Eckhert Curtis D.

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office hours: Thurs: 3:00 – 5:00 pm or by appointment

Lectures: Tues/Thurs: 6:00 – 7:50 pm

Course Website: <http://www.ph.ucla.edu/ehs/EHS%20280/index.htm>

Course Description: Lecture, four hours. Preparation: basic understanding of biology and chemistry at level required for admission to University of California at undergraduate level in engineering, physical, or natural sciences. Introduction to commonly used vocabulary in nanoscience required to appreciate biological interactions and potential toxicity of nanomaterials. Discussion of synthesis and physical-chemical characterization of engineered nanomaterials. Development of understanding of unique properties of engineered nanomaterials and how these properties contribute to biological interactions. Relation of properties of engineered nanomaterials to their potential for transport, reactivity, uptake, and toxicity in natural environments and in body. Concurrently scheduled with course C180. S/U or letter grading.

Course Objectives:

- Introduce students to commonly used vocabulary in NanoScience that will required to appreciate the biological interactions and potential toxicity of nanomaterials
- Discuss synthesis and physical-chemical characterization of engineered nanomaterials
- Develop an understanding of unique properties of engineered nanomaterials and how these properties contribute to biological interactions
- Relate properties of engineered nanomaterials to their potential for transport, reactivity, uptake, and toxicity in natural environments and in the body.

Grading Structure:

- Midterm: Multiple choice and discussion questions contributed and graded by lecturing professors (30 %)
- Final: same format as midterm (35%)
- Final report: (35 %) on topic relevant to nanotoxicology and approved by Dr. Eckhert

Required Reading Material:

Lecture notes, hand outs and references for each lecture and posted on the class website.

Course Outline		
Date	Topic	Faculty
Toxicology and Nanomaterials		
September 25	Introduction to Course and Overview of Major Principles of Toxicology	Curtis Eckhert
September 30	Toxicological Information used in Risk Assessment Models for Chemicals	Curtis Eckhert
October 2	Introduction to Nanomaterial Toxicity: Why Do We Need a Science?	Andre Nel
Chemical and Physical Properties of Nanomaterials		
Lectures on Friday Nov 14	Lutz Mäedler will be coming from Germany to lecture on the manufacture and characterization of nanoparticles.	Lutz Mäedler
October 7	Chemical and Physical Properties of Nanomaterials	Jeffrey Zink
October 9	Colloidal Properties of Nanoparticles	Eric Hoek
Exposure in the Industrial Setting and Ecological Transport and Fate		
October 14	Exposure Assessment In the Industrial Setting	Nola Kennedy & William Hinds
October 16	Fate and Transport of Nanomaterials in the Environmental Media	Arturo Keller
October, 21	Interactions of Nanomaterials with Bacteria and Ecosystems	Patricia Holden
October 23	Life Cycle Assessment (LCA) of Nanomaterials	Roland Geyer
Product Development Based on the Pharmacological, Organic and Inorganic Properties of Nanomaterials		
October 28	Nanomaterial Uptake in Cells, Subcellular Distribution, Imaging and Drug Delivery	Lenny Rome & Fuyuhiko Tamanoi
October 30	Nano-Bio Materials & Their Applications	Heather Maynard & Bruce Dunn
November 4	Nanotechnology and Water Quality	Eric Hoek
Cellular Toxicity and Methods of Assessment		
November 6	Use of a Mechanism of Cellular Injury (Oxidative Stress) to Build a Predictive Toxicological Paradigm for Safety Assessment	Andre Nel
November 13	Mechanisms of Carcinogenesis and Screening for Genotoxicity	Oliver Hankinson & Robert Schiestl
Friday November 14	Industrial Flame Synthesis of Nanoparticles Characterization of fine dry powders	Lutz Mäedler

November 18	Nanobiosensors and High Throughput Screening for Toxicological Assessment	Ken Bradley
Risk Assessment, Management and Policy		
November 20	Forecasting Toxic Risk for the Nano Technology Industry	Lynne Zucker & Michael Darby
November 25	Risk Management and Public Policy	John Froines
November 25	Review and Discussion of Projects	Curt Eckhert
November 27	Thanksgiving Holiday	
December 2	Student Projects	
Final Exam due December 8, 2008		