EHS 520  
Principles of Environmental Chemistry  
Spring 2014 Syllabus

Course Information

Instructors: Drs. Kannan, Yang, Tran, Chu, and Zhu (course director)  
Contact information: kkannan@wadsworth.org, yangk@wadsworth.org, btran@wadsworth.org, lchu@wadsworth.org, zhul@wadsworth.org

Mon. and Wed. 2:00-3:20 pm  
Location ESP B Level Conference Room

Prerequisites of the course: two years of college chemistry or the consent of the instructor

Course Description

An introductory one-semester course that teaches general principles of environmental chemistry. The course is designed for first-year graduate students or senior undergraduates.

Course Learning Objectives and Competency

1. Acquire broad knowledge of the field of Environmental Chemistry including development of methods for ultra-trace analysis of pollutants in air, water, soil and biological matrices; understanding of sources, chemodynamics and fate of environmental pollutants in ecosystems.

2. Understand the methods used to assess human and environmental exposure pathways of environmental pollutants and quantitative analysis of exposure levels; environmental processes that affect the dynamics and fate pollutants; multimedia monitoring and modeling, biomonitoring and bioaccumulation of toxic chemicals. Students should be familiar with global and regional environmental problems and be able to build a more detailed knowledge of those particular aspects of Environmental Chemistry that interest them.

3. Be familiar with the research literature, analytical techniques, and applications of those techniques in Environmental Chemistry. Interpret and critically analyze the data on environmental chemical analysis; conduct research independently and be able to perform basic statistical analysis of data generated from laboratory or field studies.

Reading Materials

Required Textbook: 

Recommended Textbooks


Grades

1. A-E graded
2. A mid-term exam, a test, and a final exam will be administered to assess students’ comprehension of material covered in lectures.
3. Mid-term Exam (~50% of grade; Kannan, Tran, and Yang’s sections)
   Test (~15% of grade; Chu’s section)
   Final Exam (~35% of grade; Chu and Zhu’s sections)

Class Policies:

Attendance: Regular attendance is necessary for academic achievement in this course. The instructor should be notified promptly in case of absence, with a valid reason provided. For absences related to medical issues, please refer to the University’s Medical Excuse Policy (www.albany.edu/health_center/medicalexcuse.shtml). If absent from lecture, the student is responsible for all material covered during that session.

Academic Integrity: Students are expected to adhere to university policies on academic integrity (see http://www.albany.edu/undergraduate_bulletin/regulations.html). Any form of academic dishonesty, including cheating or plagiarism, will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

From the University’s Standards of Academic Integrity Policy, Fall 2013:
“Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree.”

Course Schedule

Lecture #1 (1/22) Kannan Introduction to environmental chemistry, environmental processes, factors affecting chemodynamics of environmental chemicals
Lecture #2 (1/27) Kannan  Physicochemical properties that affect dynamics of chemicals in the environment; e.g., structure, density, viscosity, vapor pressure, pKa, dipole moment, heat capacity, boiling point.

Lecture #3 (1/29) Kannan  Physicochemical properties that affect dynamics of chemicals in the environment; solubility, Kow, lipophilicity, bioconcentration, biomagnification, Kaw, Henry’s law.

Lecture #4 (2/03) Kannan  Prioritizing environmental pollutants – criteria, UNEP POPs, Stockholm convention, global transport, atmospheric transport.

Lecture #5 (2/05) Kannan  A case study of environmental chemistry of legacy POPs: PCBs and PBDEs – distribution, dynamics, fate and effects of chemical; what have we learnt?

Lecture #6 (2/10) Kannan  A case study of environmental chemistry of emerging POPs: perfluorochemicals and some polar chemicals – distribution, dynamics, fate and effects of chemical; is there an end to the problem?

Lecture #7 (2/12) Tran  Soil as a reservoir for environmental chemicals, soil properties, adsorption and desorption and degradation of chemicals in soils, sources of soil contaminants, reclamation of contaminated soil/land.

Lecture #8 (2/19) Tran  Sediments and marine contamination.

Lecture #9 (2/24) Tran  Case studies on soil contamination and remediation, biogeochemical cycles of pollutants.

Lecture #10 (2/26) Tran  Detection of organic environmental pollutants: separation of mixtures using chromatography. (GC-MS, LC-MS, LC-MS/MS)

Lecture #11 (3/03) Yang  Method development and validation: demonstrating reliability of measurements, detection limits, calibration, quantitation, standards, reference materials, QA/QCs.

Lecture #12 (3/05) Yang  Measurement of environmental chemicals: sampling of environmental matrices (air, water, solids), factors affecting detection, sample processing. Which analytical method to use based on chemical properties?

Lecture #13 (3/10) Zhu  Midterm Exam

Lecture #15 (3/24) Chu

Earth’s atmosphere. Ideal gas law; mixing ratio; partial pressure; H₂O phase compositions; atmospheric pressure; Barometric Law and vertical profile of pressure; scale height; the sea-breeze circulation.

Lecture #16 (3/26) Chu

Atmospheric temperature; radiative balance of the Earth; blackbody radiation; absorption of radiation by the atmosphere; effective temperature of the Earth; radiative forcing, greenhouse gases, surface temperature and vertical profile.

Lecture #17 (3/31) Chu

Global warming; Water vapor and cloud feedbacks. Atmospheric lifetime and compositions; simple transport model (1-D); chemical kinetics, quantum yield and photolysis rate constants. Stratospheric ozone, Chapman mechanism and steady-state solution.

Lecture #18 (4/02) Chu

HOₓ, NOₓ, ClOₓ catalytic loss cycles and polar ozone loss (PSC formation); aerosol chemistry; CFCs, Montreal protocols (and USEPA); high speed civil transport; atmospheric measurements and laboratory experiments.

Lecture #19 (4/07) Chu

CFC Replacements and application. Tropospheric chemistry; tropospheric production of OH and global mean [OH]; lifetime; cycling of HOₓ and production of ozone; CO and CH₄ oxidations.

Lecture #20 (4/09) Chu

Air pollution; Ozone formation and control strategies; air quality standard; photochemical smog; automobile catalytic converter and emission standards; acid rain; natural precipitation; sources of acids: sulfur chemistry (NOₓ).

Lecture #21 (4/16) Chu

Test

Lecture #22 (4/21) Zhu

Review of aquatic chemistry; properties of water, composition of several types of water; spontaneous, equilibrium, and impossible processes; equilibrium constant and its T-dependence; reaction orders, rate constant calculation; catalyst

Lecture #23 (4/23) Zhu

Natural waters; solubility of gases in water and its temperature dependence; dissolved oxygen in water; acid-base chemistry; dissolved CO₂ in water; dissolved solids in natural waters; common ion effect; alkalinity.
<table>
<thead>
<tr>
<th>Lecture #24 (4/28) Zhu</th>
<th>Water hardness, soft water; seawater; simple oxidation and reduction reactions in water; drinking water; water treatment; chlorine and ClO₂ as disinfectants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture #25 (4/30) Zhu</td>
<td>Ozone and UV radiation as disinfectants; analysis of residuals; methods of purifying salty water; metals and nitrates in drinking water; fluoridation of drinking water; sewage treatment and sewage sludge, phosphorus in water; soaps and detergents</td>
</tr>
<tr>
<td>Lecture #26 (5/05) Zhu</td>
<td>Approaches for unselective oxidation of problem organics; air stripping; specific methods for removing ammonia and cyanide from water, hazardous waste treatment methods, solidification of hazardous wastes; chemical speciation; mercury in the environment (manufacture and uses, toxicity, mercury poisoning, methylation of mercury)</td>
</tr>
<tr>
<td>Lecture #27 (5/07) Zhu</td>
<td>Lead in the environment (production and chemistry, uses, toxicology, lead-acid battery, lead in gasoline, problems in the mining industry, cadmium in the environment, photochemical processes in the environment, light absorption.</td>
</tr>
<tr>
<td>Lecture #29 (5/12) Zhu</td>
<td>Final exam</td>
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</tbody>
</table>


Syllabus: EHS 530, Principles of Toxicology

Catalog number and title: EHS 530, Principles of Toxicology

Term and Class number: Spring 2014, #7488

Locations and Meeting Times: Axelrod Theatre, Biggs Laboratory, Wadsworth Center, Empire State Plaza, Albany; 4:15 – 5:35 pm Mondays and Wednesdays

Instructors: Dr. Xinxin Ding, and Dr. Bruce Herron,

Teaching Assistants: None

Instructor’s Contact Information: e-mail: bherron@wadsworth.org
518-473-6033 (phone)
518-473-8722 (fax)

Office Location: CMS 5239, Wadsworth Center, Center for Medical Sciences, Albany

Instructor’s Office Hours: Variable, by appointment

Course description, overview and objectives: A detailed list of course topics are provided below. The overall objective is to provide an introductory overview of the field of toxicology covering the basic principles, target organ toxicity, the toxicity of a limited group of compounds, and an introduction to modern molecular toxicology.

The principal learning objective is for the students to gain familiarity with basic building blocks of toxicology, to enable them to subsequently build a more detailed knowledge of those particular aspects of toxicology that interest them.

Course competencies: This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:

1. Acquire broad knowledge of the field of toxicology including the basic principles, target organ toxicity, and the toxicity of a select group of compounds. Know the basic building blocks of toxicology, and be able to build a more detailed knowledge of those particular aspects of toxicology that interest them.

2. Understand the molecular foundations of biological processes, including major current concepts in biochemistry and molecular biology, and have familiarity with the research literature in the molecular biosciences and techniques and applications of modern molecular toxicology.

3. Acquire basic knowledge in the area of environmental health, including two of the three sciences relevant to environmental health: chemistry, toxicology, and radiation sciences.

5. Understand the strengths and limitations of various laboratory methodologies to make value use of scientific data and their application to environmental health problems.

**Course prerequisites:** Two years of undergraduate chemistry and one year of undergraduate biology, or consent of instructor.

**Grading scheme:** The course is graded A-E. The final grade is comprised of cumulative grades from three in-class closed book examinations, and from a final examination.

**Course requirement:** A required textbook (CASSARETT & DOULL’S TOXICOLOGY 7th Ed; ISBN: 978-0-07-147051-3). Attendance at all lectures is preferred but is not essential.

**Course Policies:** All students need to be aware of the University at Albany's standards of conduct as described in the booklet *Community Rights and Responsibilities* ([http://www.albany.edu/studentconduct/standards_of_academic_integrity.php](http://www.albany.edu/studentconduct/standards_of_academic_integrity.php)). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards.

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### PRINCIPLES OF TOXICOLOGY – 2013 Spring

**Lectures at 4:15 pm to 5:35 pm in the Axelrod Theatre, Biggs Laboratory, Wadsworth Center, Empire State Plaza on Mondays and Wednesdays**

<table>
<thead>
<tr>
<th>DATE</th>
<th>LECTURE TITLE</th>
<th>CASSARETT &amp; DOULL’S TOXICOLOGY (7th Ed)</th>
<th>LECTURER</th>
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<tbody>
<tr>
<td>January</td>
<td></td>
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<tr>
<td>22 (W)</td>
<td>Principles of Toxicology</td>
<td>Chapter 2</td>
<td>Ding</td>
</tr>
<tr>
<td>27 (M)</td>
<td>Mechanisms of Toxicity</td>
<td>Chapter 3</td>
<td>Ding</td>
</tr>
<tr>
<td>29 (W)</td>
<td>ADME + Toxicokinetics</td>
<td>Chapter 5, 7</td>
<td>Gu</td>
</tr>
<tr>
<td>February</td>
<td>Biotransformation of Xenobiotics</td>
<td>Chapter 6</td>
<td>Gu</td>
</tr>
<tr>
<td>3 (M)</td>
<td>Toxicology of the Liver</td>
<td>Chapter 16</td>
<td>Gu</td>
</tr>
<tr>
<td>5 (W)</td>
<td>EXAMINATION</td>
<td>Chapter 15</td>
<td>Reliene</td>
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<tr>
<td>10 (M)</td>
<td>Toxicology of the Lung</td>
<td>Chapter 8</td>
<td>Reliene</td>
</tr>
<tr>
<td>12 (W)</td>
<td></td>
<td>Chapter 9</td>
<td>Reliene</td>
</tr>
<tr>
<td>17 (M)</td>
<td>No Class ESP Labs Closed</td>
<td>Chapter 13</td>
<td>Seegal</td>
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<td>19 (W)</td>
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<tr>
<td>24 (M)</td>
<td>Genetic Toxicology</td>
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<tr>
<td>26 (W)</td>
<td>Neurotoxicology</td>
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<tr>
<td>Month</td>
<td>Date</td>
<td>Topics</td>
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<tr>
<td>March</td>
<td>3 (M)</td>
<td>Molecular Toxicology &amp; Toxicogenomics</td>
<td>Chapter 18</td>
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<td>5 (W)</td>
<td>Cardiovascular Toxicology</td>
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<td></td>
<td>10 (M)</td>
<td>Immunotoxicology</td>
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<td>12 (W)</td>
<td>EXAMINATION</td>
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<td></td>
<td>24 (M)</td>
<td>Toxicology of the Kidney</td>
<td>Chapter 12</td>
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<td></td>
<td>26 (W)</td>
<td>Toxicology of the Skin</td>
<td>Chapter 14</td>
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<tr>
<td></td>
<td>31 (M)</td>
<td>Toxicology of the Intestine</td>
<td>Chapter 19</td>
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<tr>
<td>April</td>
<td>2 (W)</td>
<td>Reproductive Toxicology &amp; Teratology</td>
<td>Chapter 20</td>
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<td></td>
<td>7 (M)</td>
<td>Risk Assessment</td>
<td>Chapter 4</td>
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<tr>
<td></td>
<td>9 (W)</td>
<td>EXAMINATION</td>
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<td></td>
<td>16 (W)</td>
<td>Nanotoxicology</td>
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<tr>
<td></td>
<td>21 (M)</td>
<td>Ecotoxicology</td>
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<td></td>
<td>23 (W)</td>
<td>Metals</td>
<td>Chapter 23</td>
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<tr>
<td></td>
<td>28 (M)</td>
<td>Analytical/Forensic Toxicology</td>
<td>Chapter 31</td>
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<tr>
<td></td>
<td>30 (W)</td>
<td>Analytical/Forensic Toxicology</td>
<td>Chapter 31</td>
</tr>
<tr>
<td>May</td>
<td>5 (M)</td>
<td>Pesticide Regulation at EPA</td>
<td>Chapter 22</td>
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<td></td>
<td>7 (W)</td>
<td>Toxic Effects of Pesticides</td>
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<tr>
<td></td>
<td>14 (W)</td>
<td>Final Exam</td>
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# Lecture Outline

<table>
<thead>
<tr>
<th>Topic</th>
<th>Lecturer</th>
<th>Outline</th>
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</thead>
<tbody>
<tr>
<td>Principles of Toxicology</td>
<td>Ding</td>
<td>Introduction; definition of toxicology; LD50, “the dose makes the poison;” classification of toxicants; exposure characteristics; adverse effects; chemical interactions; tolerance; dose response; variation in toxic responses; animal toxicity tests</td>
</tr>
<tr>
<td>Mechanisms of Toxicity</td>
<td>Ding</td>
<td>Potential stages in the development of toxicity after chemical exposure; toxicant delivery; reaction of ultimate toxicant with target molecule; alternation of the regulatory or maintenance function of the cell; inappropriate repair and adaptation; case studies: microsomal P450 enzymes; tobacco-induced lung cancer; cardiotoxicity of doxorubicin; herbicide induced nasal toxicity</td>
</tr>
<tr>
<td>ADME + Toxicokinetics</td>
<td>Gu</td>
<td>Transport of toxicants through cell membranes; passive and active transports; routes for absorption; absorption by GI tract; first-pass effect; absorption by the lung; absorption by skin; storage of toxicants in tissues; blood-brain barrier; urinary excretion; fecal excretion; entero-hepatic cycle; one-compartment model; two compartmental model; apparent volume of distribution; elimination and clearance; bioavailability</td>
</tr>
<tr>
<td>Biotransformation of Xenobiotics</td>
<td>Gu</td>
<td>Phase I and Phase II biotransformation; cytochrome P450 enzyme; oxidation reactions catalyzed by P450 enzymes; P450 classification; factors that influence P450 activity; substrate specificity of P450; characteristics of major human P450; metabolic activation by P450; P450 knockout models; inhibition and induction of P450</td>
</tr>
<tr>
<td>Toxicology of the Liver</td>
<td>Gu</td>
<td>Vulnerability of the liver to toxicants; mechanisms of liver injury; morphology of the liver; liver sinusoidal cells; transport proteins in human hepatocytes and cholangiocytes; hepatocyte uptake and biliary secretion of endogenous solutes and toxicants; classification of xenobiotic-induced liver injury; critical factors in toxicant-induced liver injury; alcohol-induced liver disease; acetaminophen-induced liver injury; idiosyncratic liver injury; assessment of hepatic injury</td>
</tr>
<tr>
<td>Toxicology of the Lung</td>
<td>Reliene</td>
<td>The respiratory system; gas exchange; respiratory terminology; gases and particles; particle clearance; mechanisms of lung injury; acute responses to lung injury; chronic lung damage; toxic agents; methods to study lung injury</td>
</tr>
<tr>
<td>Chemical Carcinogenesis</td>
<td>Reliene</td>
<td>History of chemical carcinogenesis; cancer terminology; multistage model of carcinogenesis; genotoxic and nongenotoxic chemical carcinogens; modes of action of chemical carcinogens; testing and</td>
</tr>
<tr>
<td>Course</td>
<td>Instructor</td>
<td>Description</td>
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</tr>
<tr>
<td>Genetic Toxicology</td>
<td>Reliene</td>
<td>History of genetic toxicology; genotoxicity and mutagenicity; DNA damage and repair, methods used in genetic toxicology, in vitro and in vivo gene mutation assays, cytogenetic assays</td>
</tr>
<tr>
<td>Neurotoxicology I</td>
<td>Seegal</td>
<td>Basic neurochemistry and neurophysiology of the central nervous system; cell types and function in the central nervous system; neurons, microglia, astroglia; concept and actions of the blood brain barrier; neurochemistry of the central nervous system; neurotransmitters, neurotransmitter receptors (pre- and postsynaptic), metabolizing enzymes; role of myelin in neurotransmission</td>
</tr>
<tr>
<td>Neurotoxicology II</td>
<td>Seegal</td>
<td>Increased susceptibility to neurotoxicants during development, including mechanisms responsible for increased susceptibility; common neurotoxicants and mechanisms by which they lead to central nervous system dysfunction; increased susceptibility during aging - Parkinson's disease; bases for sexual dimorphism in susceptibility to central nervous system dysfunction during aging</td>
</tr>
<tr>
<td>Cardiovascular Toxicology</td>
<td>Herron</td>
<td>Overview of heart and vasculature anatomy; overview of heart and vasculature physiology; cardiovascular parameters that indicate toxic responses; outcomes of cardiovascular toxicity; examples of cardiovascular toxins; vascular toxicology</td>
</tr>
<tr>
<td>Molecular Toxicology &amp; Toxicogenomics</td>
<td>Ding</td>
<td>What is molecular toxicology; molecular toxicology vs molecular biology; why molecular toxicology; molecular techniques used in toxicological studies; basic concepts in genomics; toxicogenomics; pharmacogenomics; personalized medicine; exacerbated drug-drug interactions</td>
</tr>
<tr>
<td>Immunotoxicology</td>
<td>Lawrence</td>
<td>Define immunotoxicology; description of the hematopoietic and immune systems and development of lymphocytes; myeloid cells; regulation of immune functions; in vivo, ex vivo, and in vitro analysis of toxicant effects on immunity</td>
</tr>
<tr>
<td>Toxicology of the Kidney</td>
<td>Gu</td>
<td>Kidney structure; renal function and determining factors; physiology; renal transporters; susceptibility to renal toxicants; nephrotoxicants and classification; mechanism of chemically-induced renal injury; sites of toxic action; chloroform-induced renal injury; acetaminophen-induced renal injury; measurement of renal toxicity; models for renal toxicity studies</td>
</tr>
<tr>
<td>Toxicology of the Intestine</td>
<td>Zhang</td>
<td>Structure &amp; function of intestinal tract; absorption and metabolism of xenobiotics; first pass metabolism and barrier function; efflux transport and interplay between transport and metabolism enzymes; bacterial flora; enterohepatic circulation; drug bioavailability and</td>
</tr>
<tr>
<td>Course</td>
<td>Instructor</td>
<td>Description</td>
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</tr>
<tr>
<td>Toxicology of the Skin</td>
<td>Herron</td>
<td>Cellular anatomy of skin; mechanisms of adsorption; toxic responses; differences in skin site adsorption; models of skin toxicology; phototoxicology; skin cancer</td>
</tr>
<tr>
<td>Reproductive Toxicology &amp; Teratology</td>
<td>Bloom</td>
<td>Regulatory framework; species differences; historical context with examples; study designs and exposure windows; study endpoints; study interpretations; what constitutes a valid study</td>
</tr>
<tr>
<td>Risk Assessment</td>
<td>Recer</td>
<td>Introduction to chemical risk assessment including the basic definitions and procedures in hazard identification, dose-response assessment, and risk characterization for both cancer and non-cancer endpoints; basic definitions and procedures for exposure assessment including exposure routes, pathways and quantification</td>
</tr>
<tr>
<td>Nanotoxicology</td>
<td>Brenner</td>
<td>What is nanomaterial; the promise of nanotechnology; limitations with testing; issues with characterization; regulation; regulatory problems</td>
</tr>
<tr>
<td>Ecotoxicology</td>
<td>Mayack</td>
<td>Laboratory versus environmental studies: advantages, disadvantages in toxicology; Contaminants in the environment: the effects of physical, chemical and biological processes; An examination of bioconcentration, bioaccumulation and biomagnification in the dynamics of metals and organochlorine contamination; The role of biomonitoring: factors to consider in long-term programs; Emerging contaminants of concern</td>
</tr>
<tr>
<td>Toxicology of Metals: Lead Poisoning</td>
<td>Parsons</td>
<td>General overview of metal toxicology; essential versus non-essential metals; History of lead poisoning; effects of lead on various organs and systems; toxicokinetics of lead; tests for monitoring exposure to lead; population blood lead levels; treatment of acute symptomatic lead poisoning using chelating agents</td>
</tr>
<tr>
<td>Analytical/Forensic Toxicology I</td>
<td>Spink</td>
<td>Analytical role in general toxicology; analytical role in forensic toxicology; toxicological investigations of a death by poisoning; criminal poisoning of the living; forensic urine drug testing</td>
</tr>
<tr>
<td>Analytical/Forensic Toxicology II</td>
<td>Spink</td>
<td>Analytic role in therapeutic drug monitoring; analytical methods in emergency toxicology; analysis of drugs and drug metabolites; toxicological analysis using gas chromatography –mass spectrometry</td>
</tr>
<tr>
<td>Toxic Effects of Pesticides</td>
<td>Spink</td>
<td>Use of pesticides; human poisoning; regulatory mandate; mechanism of action of insecticides; signs and symptoms of toxicity; herbicides; fungicides; rodenticides; green/ecological pesticides</td>
</tr>
<tr>
<td>Pesticide Regulation at EPA</td>
<td>Dunbar</td>
<td>The food quality protection act of 1996; risk assessment for pesticides; case study of hazard characterization, endpoint selection, dietary,</td>
</tr>
</tbody>
</table>
occupational and residential exposure assessments;
TOX21 and its implications for pesticide regulation
ENVIRONMENT AND CANCER  
Course#: EHS535  
Spring 2013

COURSE INFORMATION  
Course Director: Ramune Reliene, Ph.D., Assistant Professor, Department of Environmental Health Sciences and Cancer Research Center (CRC), School of Public Health, University at Albany, rreliene@albany.edu, 518-591-7152, East Campus, CRC Rm. 310. 
- Office Hours: By appointment. 

Course Time and Location: Thursdays 1:30 P.M. to 4:20 P.M., Massry Conference Room, Cancer Research Center (CRC), East Campus, University at Albany,1 Discovery Dr., Rensselaer, NY 12144.

COURSE DESCRIPTION  
This one-semester 3 credit course will describe the impact of the Environment on Cancer in a broad sense. We will discuss potential carcinogens present in the air, food and water. In addition, we will talk about the role of obesity, circadian rhythms and infectious agents on the risk of cancer. Also, cancer prevention by diets and bioactive food compounds will be discussed based on the available research evidence from human, animal and cellular studies.

COURSE LEARNING OBJECTIVES  
Basic knowledge: Students will learn about the role of the environment in human cancers, including air-, water- and food-borne carcinogens, lifestyle factors as well as cancer prevention by diets and nutrients. In addition, students will understand the molecular mechanisms underlying cancer development and cancer prevention. They will learn laboratory approaches to test for cancer risk and understand the action mechanisms of cancer causing and cancer preventing factors. 

Communication skills: Students will develop verbal communication skills through their seminar presentation on environmental causes of organ-specific cancer or on selected environmental carcinogens. 

Critical evaluation of the work of their peers: Students will learn critically evaluate peer-reviewed research articles in the field of environmental carcinogenesis and identify study design deficiencies as well as strength and limitations of laboratory methodologies.

COURSE COMPETENCIES  
This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:
- Become part of a public health team, using scientific knowledge and communication skills to solve public health problems.
- Understand the strengths and limitations of various laboratory methodologies to make value use of scientific data and their application to environmental health problems.
- Read, critically evaluate, and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained.
- Present and orally defend knowledge gained in a public seminar.
- Acquire advanced knowledge in the chosen field.
- Assess risks from either environmental or occupational exposures and identify measures to mitigate the risks.

READINGS  
Textbook: A textbook is not required for this course. Research articles relevant to individual lectures may be introduced and will be supplied by the instructor.
OTHER COURSE REQUIREMENTS

Written and Oral reports: Each student is required to research a topic, prepare a list of peer-reviewed journal articles and give an oral Power Point presentation on environmental risk factors of organ-specific cancer of your choice, including but not limited to breast, ovarian, prostate, lung, kidney, colorectal, stomach, brain and hematological cancer, or on a selected environmental carcinogen. The list of publications/references should be double spaced with 1” margins and formatted according to the “Instructions for Authors” for the peer-reviewed journals published by the American Association for Cancer Research (http://cancerres.aacrjournals.org/site/misc/ifora.xhtml) i.e. for articles with more than 6 authors, the names of the first 6 authors must be listed, followed by "et al." For articles with 6 or fewer authors, all authors should be listed.

Reference Examples:

The Power Point presentation can be organized as appropriate to the subject, but should include summary of the literature, summary of results, strengths and limitations of the studies, suggested next steps for research and a list of cited references. The time allocated for oral presentations will be 25-30 minutes followed by 5 minutes for discussion. You should plan no more than one slide per minute. Presentation materials may be included in all exams.

GRADES
The course is graded A-E: A (95-100%); A- (90-94%); B+ (86-89%); B (81-85%); B- (76-80%); C+ (71-75%); C (66-70%); C- (61-65%); D (50-60%); E (<50%). Final course grade will be based on the mid-term exam (35%), the list of peer-reviewed publications (10%) and the oral presentation (20%). The mid-term exam will cover lecture materials and student presentations to that date and the final exam will cover only lecture material and student presentations after the mid-term. Students will prepare a list of peer-reviewed journal articles (at least 10 such publications) pertinent to their oral presentation using PubMed (http://www.ncbi.nlm.nih.gov/pubmed), as described in other course requirements. Upon approval of the instructor students will use the material presented in these articles for preparation of their oral presentation. The list of publications/references will be graded based on the relevance to the topic of the presentation and accurate formatting. Oral presentations will be graded and judged on the basis of scientific content, attractiveness of PowerPoint slides, clarity of the presentation, use of the peer-reviewed literature and ability to answer questions.

COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Class Date</th>
<th>Instructor</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 24</td>
<td>Reliene</td>
<td>Introduction to cancer and the environment</td>
</tr>
<tr>
<td>January 31</td>
<td>Reliene</td>
<td>Multi-step carcinogenesis</td>
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<td>Laboratory approaches for carcinogenicity assessment of environmental agents</td>
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<td>February 7</td>
<td>Carpenter*</td>
<td>Non-ionizing radiation and cancer</td>
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<td>February 14</td>
<td>Reliene</td>
<td>Food-borne carcinogens</td>
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<tr>
<td>February 21</td>
<td>Figge*</td>
<td>Chernobyl and thyroid cancer</td>
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<tr>
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<td>Kitto*</td>
<td>Radon occurrence and carcinogenesis</td>
</tr>
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<td>February 28</td>
<td>Reliene</td>
<td>Air-borne and water-borne carcinogens</td>
</tr>
<tr>
<td>March 7</td>
<td>Welsh*</td>
<td>Molecular basis of cancer</td>
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<td>March 14</td>
<td>Mid-term exam</td>
<td>Environmental causes of liver cancer</td>
</tr>
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<td>Infectious agents and cancer</td>
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<td>March 28</td>
<td>Sell*</td>
<td>Obesity and cancer</td>
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<td>Reliene</td>
<td>Student presentations</td>
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<tr>
<td>April 4</td>
<td>Conklin*</td>
<td>Circadian rhythms and cancer</td>
</tr>
<tr>
<td></td>
<td>Reliene</td>
<td>Student presentations</td>
</tr>
<tr>
<td>April 11</td>
<td>Conklin*</td>
<td>Cancer prevention with dietary antioxidants</td>
</tr>
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<td></td>
<td>Reliene</td>
<td></td>
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<td>April 18</td>
<td>Reliene</td>
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<td>Date</td>
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<td>Topic</td>
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<tr>
<td>April 25</td>
<td>Welsh* Reliene</td>
<td>Diet and cancer prevention I</td>
</tr>
<tr>
<td>May 2</td>
<td>Welsh* Reliene</td>
<td>Diet and cancer prevention II</td>
</tr>
<tr>
<td>May 9</td>
<td></td>
<td>Reading day</td>
</tr>
<tr>
<td>May 16</td>
<td></td>
<td>Final-exam</td>
</tr>
</tbody>
</table>

*Guest lecturers:
David O. Carpenter, M.D, dcarpenter@albany.edu
Douglas S. Conklin, Ph.D., dconklin@albany.edu
James Figge, M.D., jfigge@nycap.rr.com
Michael E. Kitto, Ph.D., kitto@wadsworth.org
Stuart Sell, M.D., ssell@wadsworth.org
JoEllen Welsh, Ph.D., jwelsh@albany.edu

Important Due Dates:
03/07: Submit a list of references to be used in your oral presentation
03/14: Mid-term exam
05/16: Final exam

**COURSE POLICIES**
All students need to be aware of the University at Albany's standards of conduct as described in the booklet *Community Rights and Responsibilities* ([http://www.albany.edu/studentconduct/standards_of_academic_integrity.php](http://www.albany.edu/studentconduct/standards_of_academic_integrity.php)). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic integrity will be strictly enforced. Any violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the *Community Rights & Responsibilities* will result in a failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany judicial system.
Catalog number: **HEHS540**

**Title:** Principles of Radiation Science

**Term:** Spring 2014

**Class number:** 7157

**Locations:**
Most lectures as well as the exams are given in Room C228, Wadsworth Center, New York State Department of Health, Empire State Plaza, Albany, NY 12201. Selected lectures (see detailed schedule) are given at SUNY East Campus, One University Place, Rensselaer, NY 12144, Room A217. Consult http://www.albany.edu/pmts/bus_schedules.php for SUNY bus schedule.

**Meeting times:** Tuesdays and Thursdays 11:00 am - 12:30 pm.

**Instructors:**
Dr. Abdul Bari, Mr. Clayton Bradt, CHP, Prof. David Carpenter, Prof. Michael Kitto, Prof. Adela Salame-Alfie, Prof. Thomas Semkow.

**Course Director contact information:**
Thomas Semkow, Wadsworth Center, New York State Department of Health, Empire State Plaza, Albany, NY 12201, Room D486C, phone 474-6071, email tms15@health.state.ny.us, office hours Mon – Fri, 9 am – 5 pm or by appointment.

**Listing:**
Fundamentals of radioactivity and nuclear transformations, interaction of ionizing radiation with matter, biological effects of radiation, radiation dosimetry and protection, radiation and public health, uses and applications of radionuclides in medicine, energy, chemistry, and environment.

**Description:**
The risk from ionizing radiation has been traditionally a part of public health. We are faced with an unavoidable natural radiation dose and are concerned with the uses of ionizing radiation such as in medicine and energy generation. This course gives a comprehensive and balanced views of ionizing radiation as appropriate for the School of Public Health students. The course consists of 8 topics. Midterm exam is scheduled after topic 5.
Topics 1 – 5 are devoted to the basic radiation science. After an introduction, basic families of elementary particles, types of ionizing radiations, and radioactive decay are described. Interactions of principal components of ionizing radiation with matter are described. Topic 4 uses some differential equations and statistical distributions. However, no such derivations will be required on the exams.

Topics 6 and 7 cover radiation protection. Internal and external dosimetry are discussed including approved by law limits of exposure. The biological effects, including cellular and molecular processes, are covered.

Topic 8 is devoted to public health as well as the uses of ionizing radiation. Important and often misunderstood radiation applications are covered, such as medical applications, nuclear energy, nuclear accidents, food irradiation, nuclear proliferation, as well as radioactive waste. Health effects of radon are described.

**Competencies:**

- Acquire advanced knowledge in the chosen field.
- Acquire analytical, field, and laboratory skills through rotations and specialty courses that provide training in the use and interpretation of results from sophisticated instrumentation.
- Read, critically evaluate, and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained.
- Demonstrate a command of the fundamentals and current state of the discipline sufficient to prepare a written proposal.
- Develop problem solving skills through application of knowledge to a research problem in the chosen track.
- Understand the methods used to assess human and environmental exposure pathways of environmental pollutants and quantitative analysis of exposure levels; environmental processes that affect the dynamics and fate pollutants; multimedia monitoring and modeling, biomonitoring and bioaccumulation of toxic chemicals. Students should be familiar with global and regional environmental problems and be able to build a more detailed knowledge of those particular aspects of Environmental Chemistry that interest them.

**Specific learning objectives:**

- Gaining basic knowledge in radiation science.
- Understanding of ionizing radiation as a public-health risk and how to approach it.
- Develop concepts on how ionizing radiation is used in other fields.
- Prepare students for HEHS541: Radioactivity Measurements Laboratory.

**Prerequisites:** college-level courses in physics, chemistry, biology, and calculus.
Credits: 3

Minimum number of students: 2

Grading policy:

A – C passing, E failing (no D grade). A $\geq 95\%$, A– $\geq 90\%$, B+ $\geq 85\%$, B $\geq 80\%$, B– $\geq 75\%$, C+ $\geq 70\%$, C $\geq 60\%$, E < 60\%.

Eight problem sets contribute to 50% of the total grade. Each problem set is due by the specified date. Late submission can only be justified on a basis of a serious personal emergency. In such case, the instructor may issue a substitute problem set. A midterm exam and a final exam contribute to the remaining 50% of the total grade. Each exam will test the knowledge of the corresponding ($\sim 1/2$) part of the course (no cumulative exams). All exams are open book.

Textbooks:

The required textbook is available from Amazon and other web distributors. Students should order the textbook themselves:


Lecture notes may be handed out to the students. Selected sections from the following books may be assigned:


Printed numerical tables are provided. Numerical data can also be obtained from:

- Nuclear decay data: www.nndc.bnl.gov
- Photon internal conversion coefficients: www.nndc.bnl.gov/hsicc/
- Photon attenuation coefficients: www.nist.gov/pml/data/xcom/index.cfm
- Electron, proton, and alpha particle ranges: www.nist.gov/pml/data/star/index.cfm

Integrity:

All students need to be aware of the University at Albany’s standards of conduct as described in the booklet Community Rights and Responsibilities (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity.
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<table>
<thead>
<tr>
<th>Topic #</th>
<th>Topic title</th>
<th>Content</th>
<th># of classes</th>
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</tr>
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<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>Radioactive decay and units, natural and artificial radioactivity. Historical account.</td>
<td>1</td>
<td>Thu Jan 23</td>
</tr>
<tr>
<td>2</td>
<td>Subatomic structure</td>
<td>Elementary particles and their interactions. Nuclear structure.</td>
<td>3</td>
<td>Thu Jan 30, Tue Feb 4, Thu Feb 6</td>
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<td>3</td>
<td>Radioactive decay and nuclear reactions</td>
<td>Alpha, beta, gamma, electron capture, internal conversion, Auger, x rays. Nuclear reactions.</td>
<td>4</td>
<td>Tue Feb 11, Thu Feb 13, Tue Feb 18, Tue Feb 25</td>
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<tr>
<td>4</td>
<td>Radioactive decay law and statistics</td>
<td>Exponential decay law, radioactive decay and growth, nuclear statistics.</td>
<td>3</td>
<td>Thu Feb 27, Tue Mar 4, Thu Mar 6</td>
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<td>5</td>
<td>Interaction of radiation with matter</td>
<td>Photons, electrons, charged particles, heavy ions, neutrons.</td>
<td>2</td>
<td>Tue Mar 11, Thu Mar 13</td>
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<tr>
<td></td>
<td>Midterm exam</td>
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<td>1</td>
<td>Tue Mar 25</td>
</tr>
<tr>
<td>6</td>
<td>Dosimetry and radiation protection</td>
<td>Units. Internal and external dosimetry. Annual limits of intake, exposure limits.</td>
<td>3</td>
<td>Thu Mar 27, Tue Apr 1, Thu Apr 3</td>
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<td>7</td>
<td>Biological effects of radiation</td>
<td>Biological responses to radiation. Cellular and subcellular mechanisms.</td>
<td>2</td>
<td>Tue Apr 8, Thu Apr 10</td>
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<td>Final exam</td>
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<td>1</td>
<td>Tue May 13</td>
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Schedule by date:

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<th>Date</th>
<th>Instructor</th>
<th>Topic</th>
<th>Location</th>
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<tr>
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<td>Tue Jan 28</td>
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<td>TS</td>
<td>2</td>
<td>Wadsworth</td>
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<tr>
<td>Thu Feb 6</td>
<td>TS</td>
<td>2</td>
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<tr>
<td>Tue Feb 11</td>
<td>TS</td>
<td>3</td>
<td>Wadsworth</td>
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<tr>
<td>Thu Feb 13</td>
<td>TS</td>
<td>3</td>
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<tr>
<td>Tue Feb 18</td>
<td>TS</td>
<td>3</td>
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<td>TS</td>
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<td>Thu Mar 27</td>
<td>CB</td>
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<tr>
<td>Tue Apr 1</td>
<td>CB</td>
<td>6</td>
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<td>Wadsworth</td>
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<td>Thu May 1</td>
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<td>Tue May 13</td>
<td>AB</td>
<td>Final</td>
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SYLLABUS

Catalog number: HEHS541

Title: Radioactivity Measurements Laboratory

Term: Fall 2014

Class number: 7872

Locations:

Wadsworth Center, New York State Department of Health, Empire State Plaza, Albany, NY 12201. Lectures in room D486, laboratory in room D486.

Meeting times:

Laboratory Tue 9:00 AM – 1:00 PM, Lecture Thu 9:00 AM – 10:30 AM.

Instructors:

Dr. Abdul Bari, Prof. Michael Kitto, Prof. Thomas Semkow.

Course Director contact information:

Thomas Semkow, room D486C, phone 474-6071, email tms15@health.state.ny.us, office hours Mon – Fri, 9 AM – 5 PM or by appointment.

Listing:

Fundamentals of interaction of ionizing radiation with matter, radiation detection, measurements, and shielding. Hands-on experience in preparations of radioactive samples for the measurements. Measurements of $\alpha$, $\beta$, and $\gamma$ radioactivity using detectors such as gas proportional, liquid scintillation, and germanium. Radon detection. Training in nuclear electronics and statistics.

Description:

The risk from ionizing radiation has been traditionally a part of public health. We are faced with an unavoidable natural radiation dose and are concerned with the uses of ionizing radiation such as in medicine and energy generation. This course gives a comprehensive training in handling of radioactive samples as well as detection, counting, and spectrometry of ionizing radiation, as appropriate for School of Public Health students. The course consists of 6 assignments, each containing 2 lectures and 2 laboratory sessions. This course is appropriate for students who wish to specialize in radiation sciences or would like to learn radiation techniques applicable to medical, chemical, environmental or physical sciences. HEHS541 offers students unique opportunities which can rarely be found in an academic
setup, since they require a collection of instrumentation difficult to find at one institution. There is some exposure to ionizing radiation, however, very small.

**Competencies:**

- Acquire advanced knowledge in the chosen field.
- Acquire analytical, field, and laboratory skills through rotations and specialty courses that provide training in the use and interpretation of results from sophisticated instrumentation.
- Read, critically evaluate, and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained.
- Demonstrate a command of the fundamentals and current state of the discipline sufficient to prepare a written proposal.
- Develop problem solving skills through application of knowledge to a research problem in the chosen track.
- Understand the methods used to assess human and environmental exposure pathways of environmental pollutants and quantitative analysis of exposure levels; environmental processes that affect the dynamics and fate pollutants; multimedia monitoring and modeling, biomonitoring and bioaccumulation of toxic chemicals. Students should be familiar with global and regional environmental problems and be able to build a more detailed knowledge of those particular aspects of Environmental Chemistry that interest them.

**Specific learning objectives:**

- Gaining knowledge and skills in handling radioactive materials including shielding, as well as in radioactive sample preparation.
- Understanding principles of electronic instrumentation used to measure ionizing radiation.
- Develop concepts how to identify and quantify radionuclides.
- Understanding uncertainty and detection limits for radionuclide assessment.

**Prerequisites:** HEHS540 and permission of the course Director. College-level courses in laboratory experiments and instrumentation leading to precision measurements.

**Credits:** 3

**Minimum number of students:** 2

**Reports:**

A research-style report is required from each assignment. The report should contain a brief description of the purpose of the assignment, description of the experimental work done,
including all the results and graphs taken in class. In addition, the report should contain any calculations, data analysis, and plots. All the questions should be answered, and conclusions given. Due to time limitations, it is important for students to concentrate on taking good data in the laboratory while leaving calculations and plotting for home, unless absolutely needed or extra time is available. Each student should prepare a separate report, even if the laboratory data are sometimes shared among students. The reports are due on the first laboratory session of the next assignment.

**Grading:**

Students will be graded based on 6 reports. The reports will be graded on 100% basis. There is 10% penalty imposed on each late report. The final grading is as follows. A – C passing, E failing (no D grade). A $\geq 95\%$, A− $\geq 90\%$, B+ $\geq 85\%$, B $\geq 80\%$, B− $\geq 75\%$, C+ $\geq 70\%$, C $\geq 60\%$, E < 60%.

**Assignment outline:**


2. $\gamma$-ray spectrometry with germanium detectors.


3. Environmental radon detection.

   Measurement of ingrowth and decay of $^{222}\text{Rn}$ in the Lucas scintillation cell. $^{226}\text{Ra}$ analysis in water.


5. Liquid scintillation counting.

   Scintillation cocktails, sample preparation. Measurement of quenching calibration, as well as $\beta$ and $\alpha$ emitters. Detection of tritium in water.

6. Radioactivity counting statistics
The purpose of this assignment is to learn the principles of radioactivity counting statistics and how to evaluate a performance of the counter. The students will measure the Poisson distribution and learn the concept of detection limit.

**Textbooks:**

The required textbook is available from Amazon and other web distributors. Students should order the textbook themselves:


Lecture notes may be handed out to the students. Selected sections from the following books may be assigned:


Printed numerical tables are provided. Numerical data can also be obtained from:

- Nuclear data: www.nndc.bnl.gov
- Photon internal conversion coefficients: www.nndc.bnl.gov/hsicc/
- Photon attenuation coefficients: www.nist.gov/pml/data/xcom/index.cfm
- Electron, proton, and alpha particle ranges: www.nist.gov/pml/data/star/index.cfm

**Integrity:**

All students need to be aware of the University at Albany’s standards of conduct as described in the booklet Community Rights and Responsibilities (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and honesty very seriously; a zero tolerance policy with regard to violations of academic integrity will be strictly enforced. Any violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc., will result in a failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany judicial system.
INTRODUCTION TO ENVIRONMENTAL HEALTH
Fall 2013, Course: HEHS590
Thursday, 5:30 P.M. to 8:20 P.M.,
East Campus George Education Center (GEC) Classroom 4 (C4)

Course Co-Directors:
• Michael S. Bloom, PhD, MS  Assistant Professor, Departments of Environmental Health Sciences and Epidemiology and Biostatistics, University at Albany School of Public Health, GEC Rm. 157 (in the Dept. of Epidemiology & Biostatistics); (518) 473-1821, mbloom@albany.edu
  o Office hours, Wednesdays, 12:00-2:00, GEC Rm. #157 and by appointment.
• Ramune Reliene, PhD, MS Assistant Professor, Department of Environmental Health Sciences and Cancer Research Center (CRC), University at Albany School of Public Health, CRC Room 310; (518) 591-7152, rreliene@albany.edu
  o Office hours, Wednesdays, 2:00-4:00, CRC Rm. #310 and by appointment.

Teaching Assistant:
• Celeste Butts, MS, Doctoral Student, Department of Environmental Health, Sciences, University at Albany School of Public Health, GEC Rm. 144 (in the Dept. of Epidemiology & Biostatistics); cbutts@albany.edu
  o Office hours, Thursdays, 2:00-4:00, GEC Rm. #144 and by appointment.

Text Book: The text book is not required; however, you are strongly encouraged to read the assigned chapters. If you do not have a background in biology and chemistry it is in your best interest to complete the textbook assignments; you will be responsible for the material.

• Available at the University at Albany Bookstore (located in the Student Center on the Uptown Campus);
• Available at Mary Jane Books on 215 Western Ave. Albany, NY 12203-1273 (518) 465-2238;
• A single copy has been placed on restricted reserve at the Dewey Library on the Downtown UAlbany campus.

Additional required readings will be distributed electronically via Blackboard.

Course Description:
This course is designed to provide you an overview of the key areas of environmental health and to prepare you to succeed in more advanced topic area courses offered at the UAlbany School of Public Health (SPH). Though the course will be conducted using a ‘traditional’ didactic format, the Blackboard Learning System will be employed to augment this class; so please be sure to explore the course Blackboard website. Lecture notes, required readings and additional supplemental readings and resources can be found on the Blackboard website. Using the perspectives of the population and community, we will address issues pertinent to the development of environmental health problems. During our exploration of myriad topics
comprising the environmental health sciences, we hope you will gain an appreciation for, and an understanding of the interaction of individuals and communities with the environment, the potential impact on health of environmental agents, and of specific applications of environmental health concepts.

Course Learning Objectives:
Students who complete this course will be able to:
1. Discuss the history and definition of environmental health;
2. Discuss the association between population growth and dissemination of environmental pollutants;
3. Describe methods used in toxicology, epidemiology and risk assessment to evaluate environmental exposures and hazards;
4. Describe policies that have been developed to manage health risks associated with exposures to environmental hazards;
5. Identify chemical, physical, microbial and nano-agents that originate in the environment and can impact human health;
6. Describe specific applications of environmental health concepts to fields such as water quality, food safety, occupational health and injury control; and
7. Demonstrate the identification, retrieval and synthesis of peer-reviewed scientific literature.

Course Competencies:
This course teaches topics and skills that relate to competencies considered critical by the Association of Schools of Public Health (ASPH) for all MPH graduates (http://www.asph.org/publication/MPH_Core_Competency_Model/index.html), including

Biostatistics: 5. Apply descriptive techniques commonly used to summarize public health data; and 9. Interpret results of statistical analyses found in public health studies.

Environmental Health Sciences: 1. Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents; 2. Describe genetic, physiologic and psychosocial factors that affect susceptibility to adverse health outcomes following exposure to environmental hazards; 3. Describe federal and state regulatory programs, guidelines and authorities that control environmental health issues; 4. Specify current environmental risk assessment methods; 5. Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety; 6. Explain the general mechanisms of toxicity in eliciting toxic response to various environmental exposures; 7. Discuss various risk management and risk communication approaches in relation to issues of environmental justice and equity; and 8. Develop a testable model of environmental insult.

Epidemiology: 1. Identify key sources of data for epidemiologic purposes; 4. Explain the importance of epidemiology for informing scientific, ethical, economic and political discussion of health issues; 6. Apply the basic terminology and definitions of epidemiology; 9. Draw appropriate inferences from epidemiologic data; and 10. Evaluate the strengths and limitation of epidemiologic reports.
Health Policy and Management: 2. Describe the legal and ethical bases for public health and health services; and 4. Discuss the policy process for improving the health status of populations.

Social and Behavioral Sciences: 2. Identify the causes of social and behavioral factors that affect health of individuals and populations; and 4. Identify critical stakeholders for the planning, implementation and evaluation of public health programs, policies and interventions.

Communicating and Informatics: 3. Discuss the influences of social, organizational and individual factors on the use of information technology by end users; 7. Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities; and 8. Use information technology to access, evaluate and interpret public health data.

Diversity and Culture: 1. Describe the roles of history, power, privilege and structural inequality in producing health disparities.

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Public Health Biology: 4. Explain the biological and molecular basis of public health; 6. Explain how genetics and genomics affect disease processes and public health policy and practice; 7. Articulate how biological, chemical and physical agents affect human health; and 10. Integrate general biological and molecular concepts into public health.

Professionalism: 1. Discuss sentinel events in the history and development of the public health profession and their relevance for practice in the field; 3. Apply evidence-based principles and scientific knowledge base to critical evaluation and decision-making in public health; 6. Analyze determinants of health and disease using an ecological framework; 7. Analyze the potential impacts of legal and regulatory environments on the conduct of ethical public health research and practice; 8. Distinguish between population and individual ethical considerations in relation to the benefits, costs and burdens of public health programs; 9. Embrace a definition of public health that captures the unique characteristics of the field (e.g., population-focused, community-oriented, prevention-motivated and rooted in social justice) and how these contribute to professional practice; and 10. Appreciate the importance of working collaboratively with diverse communities and constituencies (e.g., researchers, practitioners, agencies and organizations).

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local, state, national and international levels; and 10. Analyze the impact of global trends and interdependencies on public health related problems and systems.

This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:

1. Acquire basic knowledge in the area of environmental health, including two of the three sciences relevant to environmental health: chemistry, toxicology, and radiation sciences.

Grades:
Your final course grade will be based on 2 exams, a class term paper, 2 homework assignments and class participation:

1. **Mid-term Exam (30%)**: A written in class mid-term exam will cover the lecture and assigned reading material up to the date of the exam on **October 17th**.

2. **Final Exam (30%)**: A final written in-class exam on **December 12th** will cover the lecture and assigned reading material after the mid-term exam.

3. **Class Term Paper (25%)**: You will prepare a short term paper written on an approved topic related to an environmental exposure and human health outcome, that you will submit to Blackboard by **5:00 PM on November 14th** at the latest (you are encouraged to submit earlier). The topic will be submitted for approval using the Blackboard site by **5:00 PM October 3rd** at the latest. Do not email your topic. Late submissions will be penalized. You will lose credit if you do not follow the assignment instructions exactly.
   - This paper is to be no less than 7 and no more than 9 double-spaced pages, including the title/abstract page, but excluding the list of references. Please submit your paper as 1. an editable electronic file (i.e., MS Word document, or Google docs document, not as a .pdf file), 2. using 1 inch margins all around, 3. 12 point Times New Roman font. Be sure to number the pages consecutively starting with the title/abstract page.
   - Your first page should comprise your title, name and an abstract (a short summary of your paper not to exceed 50 words).
   - Please begin your main text on page 2. You may incorporate figures or schematics in your manuscript but be sure to label and discuss in the text and to not take up excessive space. NO QUOTATIONS ARE PERMITTED; THE WORK SHOULD BE YOUR OWN!
   - A references list should begin on the next page after your text is complete. Please format exactly according to the instructions provided in the document “Instructions for references in class paper” that can be found in the “Course Information” folder on the Blackboard site. You are expected to cite a minimum of 5 peer-reviewed primary-source manuscripts (review papers, government reports, science articles, web sites, newspapers, etc. are secondary sources do not count towards this total). You may also use secondary sources. Use Pub Med, Science Direct, SCOPUS, Google Scholar, or other search engines to identify relevant manuscripts. Also, the reference lists from reading assignments for this course may provide useful citations for your class paper. You can find links to peer-reviewed publications and to search engines
for identifying peer-reviewed publications using the ‘Web links” tool on the Blackboard site. For those unfamiliar with the information resources available at UAlbany, the University Libraries will provide a literature resources seminar during class on 9/26.

HINT: The term paper will be graded according to a rubric that can be found on the course Blackboard website in the “Class Term Paper”/”Course Information” folder.

4. Homework Assignment (10%): 2 homework assignments based on manuscripts in the peer-reviewed literature will be assigned; 1 on September 26th and 1 on October 3rd. These assignments must be submitted to the Blackboard site by 5:00 PM on October 3rd and 5:00 PM on October 10th, respectively. Late submissions will be penalized. PLEASE DO NOT CUT AND PASTE YOUR RESPONSES ONTO THE BLACKBOARD PAGE; TYPE OUT YOUR RESPONSES.

5. Class Participation (5%): In class exercises will be assigned randomly throughout the semester; participation in these exercises will contribute to 5% of the final course grade; there will be no ‘make-ups’ offered for missed in class exercises. Part of your class participation grade also entails completion of a pre-course and a post-course competencies evaluation. To find the competencies evaluations you must login to the “SPH Core-Competencies Assessments” Blackboard course and select the “EHS 590 - Pre-Course Competencies Evaluation” or the “EHS 590 - Post-Course Competencies Evaluation.” The evaluations are designed to assess your acquisition of critical competencies/information during this course. Completion of the pre-course and post-course evaluations are a requirement; however, your grades on these assessments DO NOT COUNT TOWARD YOUR COURSE GRADE (i.e., you receive credit for simply completing the assessment irrespective of your performance). Completion is very important as these data are used for UAlbany SPH accreditation purposes. The evaluations will be administered at the beginning and end of the course and the change in performance for the class as a whole will be evaluated; data will only be reported in aggregate form and so your individual performance will not be identified. For each, there are 15 questions and there is a 15 minute time limit for completion. To receive credit, the Pre-Course evaluation must be completed by September 5th at 5 PM. To receive credit, the Post-Course evaluation must be completed by December 12th at 5 PM.

Final Course Grades:  
A (95-100%); A- (90-94%); B+ (86-89%); B (81-85%); B- (76-80%); C+ (71-75%); C (61-70%); D (50-60%); E (<50%).

Course Schedule: Class Topics, Reading Assignments, & Exams

The proposed course outline is subject to change contingent on circumstances (assignment due dates & exams are in bold).

<table>
<thead>
<tr>
<th>Topic</th>
<th>Dates</th>
<th>Speaker</th>
<th>Reading Assignments</th>
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</thead>
<tbody>
<tr>
<td>Introduction to Environmental</td>
<td>8/29</td>
<td>Bloom</td>
<td>Friis Chapters 1 &amp; 4</td>
</tr>
<tr>
<td>Class</td>
<td>Date</td>
<td>Instructor(s)</td>
<td>Reading References</td>
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<tr>
<td>Health &amp; Policy</td>
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<td>Classes Suspended</td>
<td>9/5</td>
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<td>Toxicology &amp; Risk Assessment</td>
<td>9/12</td>
<td>Reliene</td>
<td>Friis Chapter 3</td>
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<tr>
<td>Epidemiology &amp; Exposure</td>
<td>9/19</td>
<td>Bloom</td>
<td>Friis Chapter 2 &amp; Hill, 1965</td>
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<tr>
<td>Assessment</td>
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<tr>
<td>Toxic Elements (1st Homework</td>
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<td>Bloom</td>
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<td>assigned)</td>
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<td>Discuss Homework 1 &amp; Toxic</td>
<td>10/3</td>
<td>Bloom</td>
<td>Friis, Chapter 7; Ibrahim et al., 2011; Lauby-Secretan et al., 2013</td>
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<td>Organic Compounds (2nd</td>
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<td>Homework assigned)</td>
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<td>Discuss Homework 2 &amp; Ionizing</td>
<td>10/10</td>
<td>Hosler &amp;</td>
<td>Friis, Chapter 8</td>
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<td>&amp; Non-ionizing Radiation</td>
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<td>Reliene</td>
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<td>Midterm Exam</td>
<td>10/17</td>
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<td>Air Quality &amp; Review Midterm</td>
<td>10/24</td>
<td>Bloom</td>
<td>Friis Chapter 10</td>
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<td>Exam</td>
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<td>Internship opportunities in</td>
<td>10/31</td>
<td>Gurzau &amp;</td>
<td>Friis Chapters 9 &amp; 11 &amp; Schnoor, 2010 &amp; Scientific American, 1998</td>
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<td>Romania &amp; Food Safety &amp; Water</td>
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<td>Reliene &amp;</td>
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<td>Safety</td>
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<td>Bloom</td>
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<td>Waste Management</td>
<td>11/7</td>
<td>Bloom</td>
<td>Friis Chapter 12</td>
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<td>Vector-borne &amp; Zoonotic Disease</td>
<td>11/14</td>
<td>Backenson &amp;</td>
<td>Friis Chapter 5 &amp; Gubler, 1998 &amp; Rosenberg and Beard, 2011</td>
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<td>Reliene</td>
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<tr>
<td>Injury Control &amp; Nanotoxicology</td>
<td>11/21</td>
<td>Reliene</td>
<td>Friis Chapter 14 &amp; Bystrzejewska-Piotrowska et al., 2009</td>
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<tr>
<td>Classes Suspended</td>
<td>11/28</td>
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<tr>
<td>Occupational Health &amp; Hygiene</td>
<td>12/5</td>
<td>Bloom</td>
<td>Friis Chapter 13</td>
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<tr>
<td>Final exam</td>
<td>12/12</td>
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* Guest speaker.

**Important Due Dates for Class Assignments:**
- 9/5: Complete pre-course competences evaluation (due at 5:00 PM);
- 10/3: Submit homework assignment #1 using Blackboard (due at 5:00 PM);
- 10/3: Submit title for class paper using Blackboard (due at 5:00 PM);
- 10/10: Submit homework assignment #2 using Blackboard (due at 5:00 PM);
- 10/17: Midterm exam;
- 11/14: Submit class paper using Blackboard (due at 5:00 PM);
- 12/12: Complete post-course competences evaluation (due at 5:00 PM);
- 12/12: Final exam (5:30-8:20 pm)

**Course Policies:**
If your schedule does not permit you to be present for one of the exams be sure to speak with the instructors as soon as possible so that we can make alternate arrangements. **There is NO EXTRA CREDIT available for this course.**
All students need to be aware of the University at Albany's standards of conduct as described in the booklet *Community Rights and Responsibilities* ([http://www.albany.edu/studentconduct/standards_of_academic_integrity.php](http://www.albany.edu/studentconduct/standards_of_academic_integrity.php)). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic integrity will be strictly enforced. Any violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the *Community Rights & Responsibilities* (see course information for a copy) will result in a failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany judicial system.

**Potential Topics for Class Term Papers:** (NOTE: these are just some ideas for appropriate topics, you are encouraged to come up with a topic of your own as well; whichever you decide be sure to focus on the environmental human health aspects of the issue):

- Do air fresheners pose a human health risk?
- Aluminum toxicity associated with environmental exposure
- Antibiotics in food animals
- Arsenic in drinking water and human health risks
- Does bisphenol A present a human health risk?
- Environmental contaminants in breast milk; risks vs. benefits
- Brownfields - policy and human health risks
- Cadmium toxicity associated with environmental exposure
- Copper toxicity associated with environmental exposure
- Environmental causes of infertility
- Environmental exposures (e.g., organochlorines, cadmium) and breast cancer.
- Climate change and water-borne disease
- Climate change and vector-borne disease
- Chromium in drinking water and human health risks
- Coal mining and human health risks
- Uses of depleted uranium and human health risks
- Dioxin in food and human health risks
- Environmental causes of precocious puberty
- E. Coli 0157:H7, human health risks and the modern food supply
- Environmental endocrine disruptors and human health risks
- Environmental causes of cardiovascular disease
- Environmental causes of diabetes
- Environmental obesogens
- Environmental causes of violence
- Environmental exposures and the immune system
- Environmental justice, health disparities and hazardous wastes
- Environmental epigenetics and human health
Fish consumption – risks vs. benefits.
Fluoride in drinking water – risks vs. benefits
Food irradiation – risks vs. benefits
Growth hormone in milk, is it a human health risk?
Human health risks and 50-60 Hz electromagnetic fields
Human health risks and cell phone use
Human health risks and electronic waste (‘E-waste’)
Human health risks and water disinfection by-products
Human health risks and benefits of ultraviolet light exposure
Human health risks and dry cleaning fluids
Human health risks and global warming
Human health risks and oil spills
Human health risks and high-sulfur coal use
Human health risks and mercury-based dental amalgams
Human health risks and methyl mercury
Human health risks and polybrominated flame retardants
Human health risks and perchlorate
Human health risks and pesticide use in food production
Human health risks and trichloroethylene
Human health risks and vinyl chloride
Human health risks and incineration of municipal waste
Possible health risks and benefits of environmental radon exposure
Possible health risks of nuclear reactor disasters
Possible health effects of mold exposure
Potential human health risks of nanoparticles
Human health risks of noise pollution
Manganese toxicity associated with environmental exposure
Potential human health risks of phthalates exposures
Health risks of environmental tobacco smoke
Potential health risks of perfluorinated compounds
Environmental factors and developmental origins of health and disease
Risks and benefits of insecticide use (e.g., DDT, pyrethroids, organophosphates, etc.)
Risks and benefits of insect repellent use (e.g., DEET).
INTRODUCTION TO ENVIRONMENTAL HEALTH – ONLINE

EHS 590 (3 CREDITS), Spring 2014

Course Director:
Hyunok Choi, Ph.D., MPH
Assistant Professor
Departments of Environmental Health Sciences and Epidemiology and Biostatistics
School of Public Health, Rm. #153
One University Place, Rensselaer, NY 12144
(518) 402-0401
Office hours, by appointment.

Teaching Assistant:
Celeste Butts, MS, Doctoral Student, Department of Environmental Health, Sciences, University at Albany School of Public Health, GEC Rm. 144 (in the Dept. of Epidemiology & Biostatistics);
cbutts@albany.edu
Office hours, by appointment.

Class Learning Objectives: Students who complete this course will be able to:
1. Describe the key events in the history of environmental health; and
2. Discuss the association between population growth and dissemination of environmental pollutants; and
3. Describe methods used in toxicology, epidemiology and risk assessment to assess environmental exposures and hazards; and
4. Describe policies that have been developed to manage health risks associated with exposures to environmental hazards; and
5. Identify chemical, physical, and microbial agents that originate in the environment and can impact human health; and
6. Describe specific applications of environmental health concepts to fields such as water quality control, food safety, and occupational health; and
7. Provide concise and peer-review literature corroborated written responses to questions concerning human health and exposure to hazardous environmental agents.

Course Description:
Please log-on to the course web site at https://blackboard.albany.edu/ you will need your UAlbany Net ID and UNIX Password to log on. This entire course is administered through this web page so you may want to bookmark for future reference. We are your instructors for this course, Hyunok Choi, an Assistant Professor in the Departments of Environmental Health Sciences and Epidemiology and Biostatistics and Lloyd Wilson, also an Assistant Professor. As you are aware, this course does not meet in the classroom as does a traditional course, but rather is conducted completely online. Unlike classroom-based courses on-line learning is more ‘student-centered’ than ‘instructor-centered’, and is likely to be more time consuming than a traditional course. Consequently, you will need to be highly motivated, self-disciplined, and an independent learner to get the most from this class, and to do well. In addition, due to
scheduling constraints some assignments will be due on a weekend day; this has been minimized when possible. This course will take substantial time and effort but we expect you will learn much and gain valuable skills in reading and interpreting the scientific literature and in appreciating the nuances of several disciplines. This course is designed to provide you an overview of the key areas of environmental health and to prepare you to succeed in more advanced topic area courses offered at the UAlbany School of Public Health (SPH). Using the perspectives of the population and community, we will address issues pertinent to the development of environmental health problems. During our exploration of four informational modules, we hope you will gain an appreciation for, and an understanding of the interaction of individuals and communities with the environment, the potential impact on health of environmental agents, and of specific applications of concepts of environmental health.

In addition to preparing you to succeed in the upper level here at UAlbany SPH major objectives of this course are to provide you the opportunity to read and become comfortable with scholarly publications related to environmental health, and to hone your technical writing skills. Thus there will be several writing assignments. In addition to assigned textbook readings and outside readings, each of the four learning modules incorporates several required online group discussions, which will be assigned throughout the duration of this course. Your performance in this course will be evaluated by your performance during 10 Online Group Discussions, on four Knowledge Assessments, and on a Final Examination.

**Course Learning Objectives:** Students who complete this course will be able to:

1. Discuss the history and definition of environmental health;
2. Discuss the association between population growth and dissemination of environmental pollutants;
3. Describe methods used in toxicology, epidemiology and risk assessment to evaluate environmental exposures and hazards;
4. Describe policies that have been developed to manage health risks associated with exposures to environmental hazards;
5. Identify chemical, physical, microbial and nano-agents that originate in the environment and can impact human health;
6. Describe specific applications of environmental health concepts to fields such as water quality, food safety, occupational health and injury control; and
7. Demonstrate the identification, retrieval and synthesis of peer-reviewed scientific literature.

**Course Information:** Here you will find this syllabus, documents pertinent to university policy and instructions and examples for the completion of the required Online Group Discussions.

**Course Competencies:** This course teaches topics and skills that relate to competencies considered critical by the Association of Schools of Public Health (ASPH) for all MPH graduates (http://www.asph.org/publication/MPH_Core_Competency_Model/index.html), including

Biostatistics: 5. Apply descriptive techniques commonly used to summarize public health data; and 9. Interpret results of statistical analyses found in public health studies.

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Professionalism: 1. Discuss sentinel events in the history and development of the public health profession and their relevant for practice in the field; 3. Apply evidence-based principles and the scientific knowledge base to critical evaluation and decision-making in public health; 6. Analyze determinants of health and disease using an ecological framework; 7. Analyze the potential impacts of legal and regulatory environments on the conduct of ethical public health research and practice; 8. Distinguish between population and individual ethical considerations in relation to the benefits, costs and burdens of public health programs; 9. Embrace a definition of public health that captures the unique characteristics of the field (e.g., population-focused, community-oriented, prevention-motivated and rooted in social justice) and how these contribute to professional practice; and 10. Appreciate the importance of working collaboratively with diverse communities and constituencies (e.g., researchers, practitioners, agencies and organizations).
Program Planning: 1. Describe how social, behavioral, environmental, and biological factors contribute to specific individual and community health outcomes.

Systems Thinking: 2. Identify unintended consequences made to a public health system; 6. Explain how the contexts of gender, race, poverty, history, migration and culture are important in the design of interventions within public health systems; 7. Illustrate how changes in public health systems (including input, processes and output) can be measured; 8. Analyze inter-relationships among systems that influence the quality of life of people in their communities; 9. Analyze the effects of political, social and economic policies on public health systems at the local, state, national and international levels; and 10. Analyze the impact of global trends and interdependencies on public health related problems and systems.

This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:

1. Acquire basic knowledge in the area of environmental health, including two of the three sciences relevant to environmental health: chemistry, toxicology, and radiation sciences.

**Learning Modules:** There are four learning modules, comprised of 13 sub-modules which you will find using the Course Content tool or the Learning Modules tool. Under each of the four modules you will find a description of the Learning Objectives for the module. Second, there will be PowerPoint slide Lecture Notes for each sub-module that will expand upon the key concepts presented in the assigned readings. You will also see a Group Discussion Assignments for each module where you will find your appointed discussion group for a module (group assignments will be the same for all discussions within a module but may change between modules), the group discussion assignment, and the posting area (threaded discussion). Discussion assignments will not be posted in advance but will appear on the first assignment day. You will also see Optional Supplemental Readings, which comprise important and relevant publications related to the material covered in each module; these are an optional resource for you to use at your discretion (or may be required for the Group Discussion Assignment). At the end of each module there will be a Comprehensive Quiz: (this also appear on the first assignment day)

1. Module One – *A Survey of the Environmental Health Sciences* provides an introduction to environmental health and policy as well as an introduction to the core disciplines of environmental health including *An introduction to environmental health, An introduction to environmental toxicology,* and *An introduction to environmental epidemiology & exposure*; and

2. Module Two – *A Survey of Hazardous Environmental Agents* addresses specific environmental agents found in the environment that may be hazardous to humans including *An introduction to toxic metals, An introduction to toxic organic compounds, An introduction to toxic radiation,* and *An introduction to toxic nanoparticles*; and

3. Module Three – *A Survey of Sources of Exposure to Environmental Agents* addresses sources of exposure to potentially hazardous environmental agents including *An*
introduction to air quality, An introduction to water quality, and An introduction to vector-borne and zoonotic disease; and

4. Module Four – A Survey of Environmental Health Applications considers the implementation of environmental health studies in our world including An introduction to food safety, An introduction to solid & liquid waste, and An introduction to occupational health & hygiene.

Under the category of Course Information you will find instructions and guidance on how the class operators including there is an Online Discussion folder. There, you will find Instructions for Using the Discussion Tool, Instructions for Formatting Citations and References, Discussion Post Examples.

**Bulletin Board:** There is a class Bulletin Board tool located in the Class Community. You can use this to chat with classmates, post questions or ideas, etc. Think of this as the equivalent of chatting outside of class when you are not actually present. This tool is for your use as students; we don’t check this on a regular basis or respond to material posted here.

**Ask a Question:** There is an Ask a Question tool located in the Discussions that you can use if you have a question; this is similar to raising your hand in class. If you see a question posed in this area by one of your fellow students, YOU SHOULD TRY TO ANSWER IT IF YOU CAN. We will try to answer any questions that students cannot. This is the way to ask something that is NOT CONFIDENTIAL in nature.

**Assessments:** You can use this tool to directly access the Comprehensive Quizzes.

**Discussions:** You can use this tool to directly access the assigned Online Group Discussions.

**Mail:** There is a Mail tool you should use for ALL CONFIDENTIAL CORRESPONDENCE WITH US, issues that you do not wish to share with other students. It is the on-line equivalent of office hours. We will also use this area for private communications with students, so remember to check it often. It is important to know that we will use this mail feature for ALL confidential discussions, and not my university email address, so PLEASE DO NOT e-mail us outside of the Blackboard Learning System for any course related issues.

**Web Links:** These links have been provided to guide you in your literature research and to make many resources readily accessible to you. We highly recommend you access the links regarding the UAlbany Libraries as this will prove an invaluable resource during this class, such as their INTERLIBRARY LOAN SERVICE (i.e., to received free full text of peer-reviewed articles delivered as .PDF files). Many useful links may be found using the tool including links to peer-reviewed and non-peer reviewed but well-edited publications, links to government and non-government organizations related to environmental health, etc. The links are arranged by topic area and then alphabetically. Please take the time to browse through the 150 or so links created for your use. IF A LINK DOES NOT WORK please alert me so it can be repaired. Moreover, IF YOU HAVE A SUGGESTION FOR A LINK, please alert me so it can be included.

**Announcements:** We will use this tool to communicate important information to you regarding
Meet Your Classmates: Be sure to post something interesting about yourself using the Meet Your Classmates tool and read about your fellow classmates. You will see that we have got things started.

Required Reading Materials: The 2nd edition (2010) of the textbook *Essentials of Environmental Health*, edited by Robert H. Friis, and published by Jones & Barlett (ISBN 0763778907) is required for this course. Unless otherwise noted, all reading assignments refer to this textbook. This book is available at the University at Albany Bookstore located in the Student Campus Center first floor, 1400 Washington Avenue Albany, NY 12222 (518) 442-5690 or online at [http://www.amazon.com/Essentials-Environmental-Health-Essential-Public/dp/0763778907](http://www.amazon.com/Essentials-Environmental-Health-Essential-Public/dp/0763778907); and at Mary Jane Books located at 215 Western Avenue on the corner of Western and Quail Street in Albany, NY, (518) 465-2238, maryjane@maryjanebooks.com, or online at maryjane@maryjanebooks.com. A digital edition of this textbook (i.e., for Kindle, etc.) is also available at [http://www.amazon.com](http://www.amazon.com). In addition, a single copy has been placed on restricted reserve at the Dewey Library on the Downtown Campus of the University at Albany.

REQUIRED AND OPTIONAL SUPPLEMENTAL READINGS will be posted on the course web site as .PDF files.

Course policies: In general, we expect that you will work diligently and devote a minimum of 12 hours per week to this course (the equivalent expectation for a traditional 3 credit course); Contingent on your background and your experience you may find yourself committing a great deal more time. More specifically, I expect that each student will:

1. Log on to the course Blackboard web site frequently. We know that some of you have other courses, research, jobs and other commitments, but it is very important that YOU LOG ON FREQUENTLY. If you fall behind you will find it very difficult to catch-up.

2. Complete the required readings, review the lecture notes, and ask questions PRIOR to completing the assignments. If you do not prepare you will be unable to participate effectively in the Online Group Discussions, or to do well on the Comprehensive Quizzes.

3. You must complete all assignments ON TIME, extensions will not be granted except under extenuating circumstances (this does not include forgetting, computer crashes, power failures, taking vacations or work travel). If you will be travelling for any purpose be sure to plan ahead so that you have internet access; THIS IS YOUR RESPONSIBILITY. If your system or internet service is unstable you may want to consider using an alternate system or service for the purposes of this class. It is your responsibility to complete all assignments in a TIMELY MANNER. If you are aware of any future conflicts please get in touch with me WELL IN ADVANCE so we can explore other arrangements.

4. We expect that each student in this class will treat her or his fellow students with respect, courtesy and dignity. This means that your comments on the assignment responses of
your classmates during discussion should be constructive and polite. Scientists often disagree with their colleagues, and criticism and debate are encouraged, but it is inappropriate to express these disagreements in an unprofessional and derogatory manner. Points will be deducted from your final grade if we deem that your behavior was unprofessional.

5. All students need to be aware of the University at Albany’s standards of conduct as described in the booklet *Community Rights and Responsibilities*. This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. I take academic integrity and honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic integrity will be strictly enforced. Any violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the *Community Rights & Responsibilities* (see course information for a copy) will result in a failing grade for the course with no opportunity for withdrawal and referral to the UAlbany judicial system.

“Plagiarism: Presenting as one's own work, the work of another person (for example, the words, ideas, information, data, evidence, organizing principles, or style of presentation of someone else). Plagiarism includes paraphrasing or summarizing without acknowledgment, submission of another student's work as one's own, the purchase of prepared research or completed papers or projects, and the unacknowledged use of research sources gathered by someone else. Failure to indicate accurately the extent and precise nature of one's reliance on other sources is also a form of plagiarism. The student is responsible for understanding the legitimate use of sources, the appropriate ways of acknowledging academic, scholarly, or creative indebtedness, and the consequences for violating University regulations.

Examples of plagiarism include: failure to acknowledge the source(s) of even a few phrases, sentences, or paragraphs; failure to acknowledge a quotation or paraphrase of paragraph-length sections of a paper; failure to acknowledge the source(s) of a major idea or the source(s) for an ordering principle central to the paper's or project's structure; failure to acknowledge the source (quoted, paraphrased, or summarized) of major sections or passages in the paper or project; the unacknowledged use of several major ideas or extensive reliance on another person's data, evidence, or critical method; submitting as one's own work, work borrowed, stolen, or purchased from someone else. For more information concerning plagiarism, see the library’s tutorial on the subject on the library web site. Graduate students will find additional information concerning Academic Integrity, Conduct, and Research Regulations on the Graduate Studies web site.” (Source: [http://www.albany.edu/graduatebulletin/requirements_degree.htm#examples_dishonesty](http://www.albany.edu/graduatebulletin/requirements_degree.htm#examples_dishonesty), accessed May 16, 2013)

6. Please do not contact me regarding course related matters through my UAlbany email account; please use the Blackboard email tool for ALL private course-related
correspondence.

7. I am, unfortunately, not capable of providing you technical support. PLEASE DO NOT REQUEST TECHNICAL SUPPORT FROM ME. If you are having trouble with the system (connecting to the website, logging on or accessing the course, participating in course activities, submitting assignments crashing, etc.) please contact UAlbany ITS Help Desk at http://www.albany.edu/its/help or (518) 442-4288. Please provide the following information: name of course, name of quiz, date and time of error, Operating System (OS), browser and JAVA version.

How Your Final Grade Will Be Calculated:

Your final grade for this course will comprise 60% on-line module group discussion assignments; 20% on-line quizzes; and 20% final exam (short essay responses)

1. Plagiarism Tutorial: This is a requirement for the class. Please complete a 5-minute tutorial with the first two weeks of the semester on [http://library.albany.edu/usered/plagiarism/resources.html](http://library.albany.edu/usered/plagiarism/resources.html) and complete the course credit acknowledgement. Please send us a copy of the certificate for my record.

2. On-line module discussion assignments (60% of final grade): There will be 10 discussions that each student is required to complete. Each Discussion will last five – seven days and require you to contribute a MINIMUM OF THREE POSTS using the Blackboard Learning System Discussion tool. Discussions will COMMENCE AT 12 AM on the assigned day and it is expected that each student will post a comprehensive response to the assigned question WITHIN 72 HOURS. A second post, in response to one or more responses made by FELLOW STUDENTS is then due WITHIN 48 HOURS of the first post deadline. (IMPORTANT: If your fellow students do not respond in a timely fashion, please do not wait for them. Please post a response to your own post.) You may agree, disagree, expand, question, etc. on a post made by one or more of the other members of your discussion group. You are free, and encouraged to post additional comments, discussions, etc. among your discussion group. Your success in this course is heavily dependent on your active participation in the group discussion assignments for each module. Initial posts are to be NO LESS THAN 350 WORDS and NO MORE THAN 1000 WORDS. Second posts are to be NO LESS THAN 250 WORDS and NO MORE THAN 750 WORDS. There are no word limits for posts beyond the second for an assignment. Your grade for each assignment will be weighted more heavily towards your first post, next on your second post, and so on and so forth if you make additional posts. Each of your posts should be numbered and have a CONCISE BUT MEANINGFUL TITLE, reflecting the thesis of your argument. For example, if the Post is about the toxicity of mercury and is the first Post for the assignment, the title would look something like: Discussion 1, Post 1 Mechanism of Mercury Toxicity. The 2nd Post may look like Discussion 1, Post 2 Mercury Toxicity compared to Cadmium Toxicity. You are required to employ the PEER-REVIEWED LITERATURE to support your arguments/premise using the peer-reviewed literature using the citation format detailed in the course information folder. Use AT LEAST THREE PEER-REVIEWED citations PER EACH SINGLE POST to receive maximum credit. YOUR TEXTBOOK DOES NOT QUALIFY AS ONE OF THE CITATIONS. You are also required to have a LIST OF REFERENCES and in-text
citations as well as reference lists must follow the REQUIRED FORMAT EXACTLY as described in the Course Information. Please DO NOT post your response as an attachment but use the response window provided by Blackboard. You may want to compose your response using word processing software and then cut and paste to Blackboard. See the Web Links tool for links to online databases and peer-reviewed journals, which you may use to identify references. You may also find the Supplemental Readings for each module useful during participation in the online discussions. A detailed RUBRIC for how I will evaluate discussion assignments is included below. Also, please consult the EXAMPLES provided in the Course Information. The group discussion assignment schedule may be found below. You will receive a raw grade (i.e. a numeric sum) out of a maximum total of 25 points for each discussion. I will review each student post and base your grade on the overall quality of your contribution to the discussion thread using the criteria below.

3. Comprehensive Quizzes (20% of final grade): A comprehensive quiz will be assigned at the conclusion of each of the four learning modules. These are designed to evaluate your acquisition of the reading and lecture materials assigned for each sub-module. Most quiz questions are in the multiple choice or true-false format, a few are in a matching format. Once assigned, you will be able to access each quiz using the Assessments tool (or directly from the course module). You will have a minimum of a 48 HOUR TIME-FRAME in which you can open the quiz at your convenience. However, you will have LIMITED TIME TO COMPLETE each quiz once opened (i.e., once you click on the ‘begin assessment’ link you will have ONLY 50 MINUTES to complete the quiz). You will not be able to return to the quiz if you close it, and you will be locked out after 50 minutes, receiving no credit for unanswered questions. Moreover you will be UNABLE TO GO BACK AND CHANGE RESPONSES once answered. The quizzes are designed so that you will not have time to use resources to look up the response to each question. We highly encourage you to complete the reading assignments, review the lecture notes, and to study PRIOR TO BEGINNING THE QUIZ. Also, BE SURE TO SAVE EACH RESPONSE PRIOR TO ADVANCING TO THE NEXT QUESTION, if you advance without saving a response you will lose credit for that question. Also be sure to SUBMIT YOUR COMPLETED QUIZ to the system.

4. Final exam (20% of final grade): The final examination will be based on all of the material covered during the semester. This will comprise short essay questions addressing each of the subtopics covered over the semester. You will have several days available to you for completion of the final exam. However, once you begin the final exam you will have only 3 hours to finish and the exam.

Final Grades:

<table>
<thead>
<tr>
<th>Percent</th>
<th>Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>95-100%</td>
<td>A</td>
</tr>
<tr>
<td>90-94%</td>
<td>A-</td>
</tr>
<tr>
<td>86-89%</td>
<td>B+</td>
</tr>
<tr>
<td>81-85%</td>
<td>B</td>
</tr>
<tr>
<td>76-80%</td>
<td>B-</td>
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<tr>
<td>71-75%</td>
<td>C+</td>
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<tr>
<td>66-70%</td>
<td>C</td>
</tr>
<tr>
<td>61-65%</td>
<td>C-</td>
</tr>
<tr>
<td>50-60%</td>
<td>D</td>
</tr>
<tr>
<td>&lt;50%</td>
<td>E</td>
</tr>
</tbody>
</table>

We may move the grading cut-point depending on the final distribution of points (i.e., ‘curve’ the scale), but I will not move the cut-point upwards (i.e., increase the standard). A PASSING GRADE ON THE FINAL EXAM is required to receive a passing grade in this course. Reading Assignments and Comprehensive Quiz Schedule
(Note: Assignments begin at 12:01 AM on the “Start” date and end at 11:59 PM on the “End” date; I may modify this schedule as required) **Schedule for Online Discussion Assignments**

(Note assignments begin and at 12 AM on the “Start” date and end at 11:59 PM on the “End date”; we may modify the schedule as we see appropriate.)
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Unacceptable</strong></td>
</tr>
<tr>
<td><strong>Spelling / Grammar</strong></td>
<td>(0 points) Preparation is clearly very careless.</td>
</tr>
<tr>
<td><strong>Possession and Depth</strong></td>
<td>(0 points) Posts add little or no value to the discussion, demonstrate lack of preparation, or are completely off topic.</td>
</tr>
<tr>
<td>Criteria</td>
<td>Performance Indicators</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Originality and Independence</td>
<td>(0 points) Completely off the topic regarding the questions posed on the Discussion Assignment</td>
</tr>
<tr>
<td>Citations</td>
<td>(0 points) Less than 2 peer-reviewed citations provided in text or no reference list provided.</td>
</tr>
<tr>
<td>Quantity Of Posts</td>
<td>(0 points) Less than 2 posts are provided.</td>
</tr>
</tbody>
</table>
**Reading Assignments and Comprehensive Quiz Schedule**
(Note: Assignments begin at 12:01 AM on the “Start” date and end at 11:59 PM on the “End” date; I may modify this schedule as required)

<table>
<thead>
<tr>
<th>Topics &amp; Activities</th>
<th>Start</th>
<th>End</th>
<th>Reading Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 1: A Survey of the Environmental Health Sciences</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1: Introduction</td>
<td>1/22</td>
<td>1/26</td>
<td>Ch. 1 &amp; 4</td>
</tr>
<tr>
<td>1.2: Toxicology</td>
<td>1/26</td>
<td>1/30</td>
<td>Ch. 3.</td>
</tr>
<tr>
<td>1.3: Epidemiology &amp; Exposure Assessment</td>
<td>1/31</td>
<td>2/07</td>
<td>Ch. 2.</td>
</tr>
<tr>
<td><strong>Module 1 Quiz</strong></td>
<td>2/07</td>
<td>2/13</td>
<td>Online assessment tool.</td>
</tr>
<tr>
<td><strong>Module 2: A Survey of Hazardous Environmental Agents</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1: Toxic metals</td>
<td>2/07</td>
<td>2/16</td>
<td>Ch. 6 &amp; Iavicoli et al., 2009; Jarup, 2003.</td>
</tr>
<tr>
<td>2.2: Organics</td>
<td>2/16</td>
<td>2/25</td>
<td>Ch. 7 &amp; Diamanti-Kandarakis et al., 2009.</td>
</tr>
<tr>
<td>2.3: Radiation</td>
<td>2/25</td>
<td>3/06</td>
<td>Ch. 8.</td>
</tr>
<tr>
<td><strong>Module 2 Quiz</strong></td>
<td>3/07</td>
<td>3/13</td>
<td>Online assessment tool.</td>
</tr>
<tr>
<td><strong>Module 3: Sources of Exposure to Environmental Agents</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 Air Quality</td>
<td>3/06</td>
<td>3/14</td>
<td>Ch. 10.</td>
</tr>
<tr>
<td>3.2 Water quality</td>
<td>3/22</td>
<td>3/31</td>
<td>Ch..</td>
</tr>
<tr>
<td>3.3: Vector-borne &amp; zoonotic disease</td>
<td>3/31</td>
<td>4/08</td>
<td>Ch. 5 &amp; Gubler, 1998.</td>
</tr>
<tr>
<td><strong>Module 3 Quiz</strong></td>
<td>4/02</td>
<td>4/08</td>
<td>Online assessment tool</td>
</tr>
<tr>
<td><strong>Module 4: A Survey of Environmental Health Applications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1: Waste management</td>
<td>4/08</td>
<td>4/16</td>
<td>Ch. 12.</td>
</tr>
<tr>
<td>4.2: Food Safety</td>
<td>4/16</td>
<td>4/19</td>
<td>Ch. 13.</td>
</tr>
<tr>
<td><strong>Module 4 Quiz</strong></td>
<td>5/1</td>
<td>5/07</td>
<td>Online assessment</td>
</tr>
<tr>
<td><strong>Final Examination</strong></td>
<td>5/10</td>
<td>5/12</td>
<td>Online assessment</td>
</tr>
</tbody>
</table>
### Schedule for Online Discussion Assignments

(Note: Assignments begin at 12:01 AM on the “Start” date and end at 11:59 PM on the “End” date; I may modify this schedule as required)

<table>
<thead>
<tr>
<th>module</th>
<th>Discussion</th>
<th>Start</th>
<th>1st Post Due</th>
<th>2nd Post Due</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>1</td>
<td>1/22</td>
<td>1/26</td>
<td>1/30</td>
<td>Population pressure &amp; environmental health</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1/30</td>
<td>2/03</td>
<td>2/07</td>
<td>Toxicology &amp; Epidemiology</td>
</tr>
<tr>
<td>2nd</td>
<td>3</td>
<td>2/07</td>
<td>2/11</td>
<td>2/16</td>
<td>Metals</td>
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<tr>
<td></td>
<td>4</td>
<td>2/16</td>
<td>2/19</td>
<td>2/25</td>
<td>Organics</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2/25</td>
<td>2/28</td>
<td>3/06</td>
<td>Radiation</td>
</tr>
<tr>
<td>3rd</td>
<td>6</td>
<td>3/06</td>
<td>3/09</td>
<td>3/14</td>
<td>Air Quality</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>3/22</td>
<td>3/26</td>
<td>3/31</td>
<td>Water Quality</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>3/31</td>
<td>4/04</td>
<td>4/08</td>
<td>Vectorborne &amp; Zoonotic Diseases</td>
</tr>
<tr>
<td>4th</td>
<td>9</td>
<td>4/08</td>
<td>4/12</td>
<td>4/19</td>
<td>Waste &amp; Food Management</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>4/22</td>
<td>4/26</td>
<td>4/30</td>
<td>Occupational Health</td>
</tr>
</tbody>
</table>
Introduction to Occupational Health
EHS 591 – Spring 2013

COURSE INFORMATION

Instructors:
Matthew Caddell DO, MPH
Matthew Mauer DO, MPH
Jean McMahon MD
John Van Raalte MS, CIH

Contact Information:
Occupational and Environmental Health Center of Eastern NY
1873 Western Avenue
Albany, NY 12203
Phone: (518)-690-4420
Fax: (518)-690-4427

Course time and location: Wednesday 5:30 – 8:30 pm at the School of Public Health

Pre-requisites: None

COURSE DESCRIPTION

This course will provide students with a strong foundation in the field of occupational health. Prevention of common occupational injuries and illnesses will be emphasized. Topics in industrial hygiene and applicable regulatory matters will be addressed. Regional and state-wide issues with respect to occupational health and safety will be explored.

COURSE LEARNING OBJECTIVES AND COMPETENCIES*

Learning Objectives: As a result of this course, students will be able to:
1. Understand the basics of industrial hygiene and occupational safety.
2. Identify some common occupational injuries and illnesses as well as strategies for their prevention.
3. Understand the basics of occupational toxicology.
4. Understand occupational regulatory issues such as the OSHA-Act and workers compensation legislation.
5. Appreciate regional occupational health issues such as programs at the NYS Department of Health and issues related to the field of nanotechnology.
6. Demonstrate research and communication skills by writing a class paper and delivering an oral presentation.
Competencies: This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:

- Become part of a public health team, using scientific knowledge and communication skills to solve public health problems.
- Acquire basic and advanced knowledge in selected concentrations.
- Have a broad knowledge of the field of environmental health including an understanding of the interaction of principles contained in fundamental environmental chemistry, biology, toxicology, epidemiology and general environmental health. Using this fundamental knowledge the students will then develop a refined knowledge related to their particular field of study within environmental or occupational health.
- Assess risks from either environmental or occupational exposures and identify measures to mitigate the risks.

READINGS


Selected readings from NIOSH and OSHA web-sites.

GRADES

Grading Break Down:
Mid-Term 25%  
Final Exam 25%  
The final exam is not cumulative.  
Student Paper 20% 
The Student paper shall be 8-10 pages in length (double-spaced, one-sided, with references) on a particular topic of interest to the student in the field of Occupational Health and Safety. The student will need to discuss their topic of choice beforehand with an instructor for approval. 
Student Presentation 15% 
Each student will present their paper topic to the group for 10-minutes with 5-minutes reserved for discussion time.
Class Participation 15% 
Class Participation is defined as students submitting on an index-card the correct response to a question by the lecturer at the end of the each class.

Grading Scheme: This course is graded A – E

POLICY ON ACADEMIC INTEGRITY

All students need to be aware of the University at Albany's standards of conduct as described in the booklet Community Rights and Responsibilities (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of
misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. Any violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the Community Rights & Responsibilities (see course information for a copy) will be referred to the UAlbany judicial system.

### COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Class #</th>
<th>Instructor(s)</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>McMahon</td>
<td>Intro to Occupational Health and Safety</td>
<td>Preface, Forward, pp. 3-37*</td>
</tr>
<tr>
<td>Class 2</td>
<td>McMahon</td>
<td>Overview of Occupational Toxicology</td>
<td>15 (Box), pp.100-110, pp. 442-444*</td>
</tr>
<tr>
<td></td>
<td>Caddell</td>
<td>Repetitive Stress Injuries</td>
<td>157,216,313,480,499* Chapter 7**</td>
</tr>
<tr>
<td>Class 3</td>
<td>McMahon</td>
<td>Pesticides/ NYSDOH Clinic System/ Health Disparities</td>
<td></td>
</tr>
<tr>
<td>Class 4</td>
<td>Caddell</td>
<td>Continue RSI/ Mental Health-Sleep/ Occ Data</td>
<td>184, 410, 464* Chapter 3**</td>
</tr>
<tr>
<td>Class 5</td>
<td>Maurer</td>
<td>Occupational Health: NYS Programs/ WTC Disaster</td>
<td></td>
</tr>
<tr>
<td>Class 6</td>
<td>McMahon, Caddell</td>
<td>Laboratory Animal Allergy (LAA)/ Occupational Dermatology</td>
<td>75, 179, 406,451*</td>
</tr>
<tr>
<td>Class 7</td>
<td>Caddell</td>
<td>Occupational Pulmonary Disorders</td>
<td>93,98,110,166,269,432,344,340,407,444,320*</td>
</tr>
<tr>
<td>Class 8</td>
<td></td>
<td>MIDTERM (IN CLASS)</td>
<td></td>
</tr>
<tr>
<td>Class 9</td>
<td></td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>Class 10</td>
<td>McMahon, Caddell</td>
<td>Noise/ Asbestos</td>
<td>223-231* 93-99*</td>
</tr>
<tr>
<td>Class 11</td>
<td>McMahon</td>
<td>Sectors</td>
<td>NIOSH Web-Site</td>
</tr>
<tr>
<td>Class 12</td>
<td>Van Raalte</td>
<td>Industrial Hygiene I</td>
<td>Chapter 6** OSHA Web Site</td>
</tr>
<tr>
<td>Class 13</td>
<td>Van Raalte</td>
<td>Industrial Hygiene II</td>
<td>Chapter 6**</td>
</tr>
</tbody>
</table>
Class 14  Caddell  Workers Compensation

Class 15  McMahon  Nanotechnology
Low Income Workers

Class 16  CLASS PRESENTATIONS (IN CLASS)

Class 17  FINAL EXAMINATION (IN CLASS)


Welcome!

This is the course website for EHS 603/EPI 613, Occupational and Environmental Epidemiology, at the School of Public Health, University at Albany. This course will introduce students to how epidemiologists investigate the health effects of exposure to hazardous agents in the workplace and environment. It’s a “blended course” in that it includes both in class and online elements. Your instructor is Dr. Edward Fitzgerald. I hold faculty appointments in both the Departments of Environmental Health Sciences and Epidemiology and Biostatistics.

This course is divided into modules. It begins with Course Information and Syllabus. I recommend that you read this module as soon as possible, as it contains all the information that need to know about the course, including how you will be evaluated. The content part of the course is in two parts - Methods and Special Topics. These modules will open as the course progresses and include PDF's of the lecture slides. In addition, one module will include the online Case Study discussions that will form an important part of this course.

I'll be logging in between classes so don’t hesitate to ask us a question if something isn't clear. I suggest using the Ask a Question section at the end of the each module so that your fellow students can see the question and my response, but if your question is confidential, send us an email.

Welcome and have fun!

Contact Information

Instructor: Edward F. Fitzgerald
Course Number: HEHS 603/HEPI 613
Semester: Spring, 2014
Mailing Address: School of Public Health, Departments of Environmental Health Sciences and Epidemiology and Biostatistics, One University Place, Rensselaer, NY 12144
Private Communications: For private communication with us, please use my email address (efitzgerald@albany.edu) or the Message feature of the course. Public questions can be posted using Ask A Question.
Phone: 518-402-0262
Logon Schedule: I will be logging on between classes and occasionally on weekends

Course Objectives

This course is designed to teach how epidemiologists study human exposure to and health effects from exposure to hazardous agents in the environment and workplace.

Upon the successful completion of this course, the student will be able to:
1) Explain the history of environmental and occupational epidemiology;
2) Understand toxicological principles relevant to environmental and occupational epidemiology;
3) Differentiate between experimental, cohort, case-control, and other study designs used to identify environmental and occupational risk factors for disease and summarize their relative strengths and weaknesses.
4) Explain how epidemiologists identify and define exposure and disease in environmental and occupational studies and their relative strengths and weaknesses;
5) Understand how biomarkers of exposure, disease, and susceptibility can be used in environmental and occupational epidemiology;
6) Discuss how bias, random error, and confounding can affect environmental and occupational studies and what can be done to minimize their effects;
7) Understand how air pollution, climate, and other specific exposures affect human health.

This course is also reading, writing, and research intensive, and uses student-led discussions as a major teaching tool. Consequently, students who successfully complete this course will be able to:
8) Critically read, write, and discuss scientific concepts and methods;
9) Search for and locate peer reviewed articles in biomedical journals using online tools such as Pub Med;
10) Develop “thought-provoking” questions and moderate discussion forums;
11) Provide constructive feedback and assistance to their fellow students.

The course is also relevant to the following EHS departmental competencies:
1) Acquire skills in collecting and analyzing environmental data, dose-response assessment and risk assessment.
2) Become part of a public health team, using scientific knowledge and communication
3) Read, critically evaluate, and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained.
4) Assess risks from either environmental or occupational exposures and identify measures to mitigate the risks.

Readings

The textbook for the course is *Environmental Epidemiology: Study methods and application* by Dean Baker and Mark Nieuwenhuijsen, published by Oxford University Press, New York, copyright 2008. You can purchase the book from on-line outlets such as Amazon and Barnes and Noble. I will also post for reading some chapters from *Research Methods in Occupational Epidemiology* (second edition) by Harvey Checkoway, Neil Pierce, and David Kriebel, published by Oxford University Press, NY, 2004. There will also be supplemental readings attached to some modules, and some modules will also have a case study to read for discussion.

Course Learning Activities

Textbook and Key Concepts

Each of the modules is organized in a similar fashion. First, there will be overview of the module, outlining what will be covered. Reading assignments from the textbooks or other sources will then be assigned. Second, there will be Power Point slides that supplement and expand upon the key concepts presented in the textbook and form the basis for the in-class lectures. It is important that you master the material in both the textbook and the lectures, since they both contain the information that you need to successfully complete your other assignments.

Quiz

After the methodological part of the course is completed, there will be a quiz to test your knowledge. It will relate to the material in the textbook and lectures, and consist of a set of questions and problems, some of which will require mathematical computations that are important in environmental and occupational epidemiology. The quiz will be online, so you can use the slides and textbooks to help you complete it. You may NOT discuss it with other students or anyone else but the instructors, that is, we expect that you will work independently.

Case Studies

A very important part of the course will be the online discussion of a "case study" that illustrates some of the principles or methods discussed in this course. These case studies will be articles from peer reviewed journals. The discussion of each case study will consist of two parts.

Development of Discussion Questions

Each student will have the opportunity to develop a critical thinking question regarding the article assigned for the case study. They will share privately with the instructors and then revise it to reflect our input and re-submit it to us for final approval.

Open Forum

After we have approved the final version of the question, the student will present the question online to the other students and moderate the subsequent online discussion. The other students need to post at least three responses to the question during the discussion period. We will monitor and evaluate the discussions, but will usually not actively participate in order to avoid unduly influencing the discussion. Consequently, it is the responsibility of the student moderator to respond to the posts of the other students and to ensure that the discussion remains relevant and on track.

Note that we will not meet in class while these online discussions are in progress, but we will meet and discuss them in class upon their completion.

Final Paper and Presentation

Each student will also prepare a final paper summarizing the evidence pro and con regarding a current controversy in occupational or environmental epidemiology. In addition, the student will give a presentation to us and the class summarizing the key points of his or her paper.

How You Will Be Evaluated

Student Led Discussions

40% of your final grade for this course will be based on your participation in the online discussions of the case studies. If you are a student moderator, your discussion grade will be determined by how "thought-provoking" are the questions that you propose and how successfully you in response.
sucinct summary of the discussion. If you are a student respondent, your discussion grade will be determined by the quality and quantity of participation. Your contributions should be thoughtful, relevant, original, and help stimulate the discussion. Responses such as "I agree" or "OK" are not acceptable. The subject line of your response should also be a complete sentence or phrase that succinctly conveys the main point of your argument. We expect that all students will respond early and often to the discussion questions – do not wait until the end of the discussion period to post your contributions, or post all of your responses on one day and then remain silent. Your success in this course depends heavily on your active participation throughout the discussion period for each module. A detailed rubric for how we will evaluate the student-led discussions is included as a subdocument in the Discussions module. As mentioned in the rubric, a high quality post includes references to peer reviewed biomedical articles to support your arguments.

Quiz

10% will be based on the quiz that you submit after the Methods modules are completed. It will assess how well you have mastered the material in the slides and the textbooks up to that point in the class.

Final Paper

25% of the final grade will be based on a final paper. The final paper will address a controversial topic in occupational or environmental epidemiology where the student critically summarizes the evidence pro and con and then takes and supports a position. You can propose your own topic or choose one from the list on the following page, but you must notify me of your choice on or before February 28. The final paper shall consist of three sections, described below.

Section 1. Literature Review

This section must not be limited to a simple listing of study results. Rather, the student is expected to summarize the methodologies and results of the studies (study design, exposure assessment, outcome definition and selection etc.) and thoroughly discuss the strengths and limitations of the methodological approaches, the issues of bias and confounding resulting from the methodologies chosen for the study, and the impact of these strengths, limitations and biases on the study results. Helpful Hint: Creating a table with columns for study design, outcome definition, exposure, results and statistical methods will help you in framing your discussion. An example will be presented and discussed in class.

Section 2. Based on section 1, state and defend your position on the controversy.

Section 3. Discuss what you think should be the next steps in addressing the controversy and why.

The paper must not exceed 20 pages doubled spaced, excluding references and tables. Standard margins and 12 point fonts must be used. I will provide a list of some possible topics to choose from, but feel free to pick your own topic with my approval. You must notify me of your selected topic by February 28.

Note that a draft of Section 1 of your paper is due on April 4. The purpose is to allow me time to provide you with constructive feedback before the final version of the complete paper is due five weeks later (May 9). 10% of your grade will be determined by your grade on this draft.

Final Presentation

Each student will summarize the key points of his or her paper as a brief oral presentation before the class and faculty for 10%.

Class Attendance and Participation

Your attendance and participation in class will determine your final 5%.

Final Grade

<table>
<thead>
<tr>
<th>Points</th>
<th>Grade</th>
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<tbody>
<tr>
<td>&gt; 95</td>
<td>A</td>
</tr>
<tr>
<td>90 - 94</td>
<td>A-</td>
</tr>
<tr>
<td>86 - 89</td>
<td>B+</td>
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<tr>
<td>75 - 85</td>
<td>B</td>
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<td>70 - 74</td>
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<td>65 - 69</td>
<td>C+</td>
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<tr>
<td>60 - 65</td>
<td>C</td>
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<tr>
<td>&lt; 60</td>
<td>D or less</td>
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</table>

I reserve the right to move the grading cut-point depending on the final distribution of points, but in no case will we will move the cut-point upwards.

My Expectations

In general, I expect that you will work diligently and devote at least as much time to this course as you would for any graduate course. Unlike solely classroom-based courses, however, "blended" learning is more student-centered than teacher-centered. Consequently, you will need to be highly motivated, self-disciplined, and an independent learner.

Specifically, I expect that each student will:

1. Log onto the course website often. I know that some of you have full-time jobs and other commitments, but it is very important that YOU LOG ON FREQUENTLY, ESPECIALLY DURING THE ONLINE DISCUSSION PERIODS, which may include weekends. Otherwise, you will fall behind very quickly and find it very difficult to catch-up.

2. Read the textbook chapters and the Power Point slides for each module before entering the online discussions. Otherwise, you will not be able to contribute meaningfully to the discussion, and your grade will suffer accordingly.

3. You need
discussion between you and your fellow students. If you do not actively participate on a regular basis, then you will diminish your ability to comprehend the subject matter. By active participation I mean that you will ENTER THE DISCUSSION EARLY, PROVIDE MEANINGFUL INPUT, NOT MERELY RESPOND WITH "OK" OR "THAT'S RIGHT", AND MOST IMPORTANTLY CONTRIBUTE IN A POSITIVE MANNER TO THE OVERALL EXPERIENCE OF THE ENTIRE CLASS. Remember, 40% of your grade in this class is determined by the quality and quantity of your participation in discussions.

5. It is CRITICAL that the students who will develop the questions and lead the discussion for the case study read the textbook chapters, Power Point slides, and case study as soon as the new module opens. They need to read this material, then develop, finalize, and, after our review, be ready to post the discussion questions very soon after the module begins so that there is sufficient time for the discussion to develop. We will inform students at the beginning of the course what modules they have been assigned as student discussion moderators, and post their names to remind them when their module opens.

6. I expect that each student in this class will treat his or her fellow students with respect, courtesy and dignity. This means that your comments on the workshop assignments of your classmates and in the discussion groups should be constructive and polite. Scientists often disagree with their colleagues, but it is inappropriate to express these disagreements in an unprofessional and derogatory manner. Points will be deducted from your final grade if I deem that your behavior was unprofessional.

7. I encourage collaboration among students during this course. For example, the Case Studies online discussions are designed to foster interaction among students and have them assist one another. However, there are times when you need to work independently. Specifically, you must submit your quiz individually and there will be no collaboration among students or between students and anyone else when taking the quiz.

8. All students need to be aware of the University at Albany's standards of conduct as described in the booklet "Community Rights and Responsibilities". This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards.

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## Schedule

**Course Schedule**

The course officially begins on January 22, although the website may be open earlier. Each module will open in sequence as the course progresses. The deadline for each assignment is midnight on the due date. The course ends with student presentations on May 5 and 7 and final papers are due May 11. The class will NOT meet when the Case Study discussions are underway online, as noted by the dates in RED.

### COURSE CALENDAR AND ASSIGNMENT SCHEDULE

<table>
<thead>
<tr>
<th>Topics/Activities</th>
<th>Start</th>
<th>End</th>
<th>Assignments Due</th>
</tr>
</thead>
</table>
| Introduction      | January 22 | January 22 | **Readings:** Course Information Documents; Baker, Chapt 1 and Checkoway, Chapt 1; Due Date: By January 22  
**Key Concepts:** Introduction and Overview (Dr. Fitzgerald) |
| Toxicology        | January 27 | January 27 | **Readings:** Baker, Chapt 2; Due Date: By January 27  
**Key Concepts:** Toxicology (Dr. Fitzgerald) |
| Study Design      | January 29 | January 29 | **Readings:** Baker, Chapt 6 and Checkoway, Chapt 3; Due Date: By January 29 (Recommended - Baker, Chapt 8 and 11)  
**Key Concepts:** Study Design (Dr. Fitzgerald) |
| Exposure Assessment | February 3 | February 5 | **Readings:** Baker, Chapt 3 and Checkoway, Chapt 2 Due Date: By February 3  
**Key Concepts:** Exposure Assessment - Part I and II (Dr. Fitzgerald) |
| Outcome Assessment | February 10 | February 10 | **Readings:** Baker, Chapt 4, Due Date: By February 10  
**Key Concepts:** "Outcome Assessment (Dr. Fitzgerald) |
| Case Study #1     | February 12 | February 19 | **Readings:** TBA, Due Date: By February 12  
**Case Studies Area:** Open Forum for Entire Class Start Date: February 12 End Date: February 18 In-Class Discussion: February 19 |
| Statistical Analysis | February 24 | February 24 | **Readings:** Baker, Chapt 7, Due by February 24 (Optional - Checkoway, Chapt 9)  
**Key Concepts:** "Statistical Analysis (Dr. Fitzgerald) |

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https://blackboard.albany.edu/webapps/blackboard/content/listContentEdi...
Bias, Confounding, and Causality  February 26  February 26  Readings: Baker, Chaps 5 and 16 and Checkoway, Chapt 4  Due Date: By February 26  Key Concepts: "Bias, Confounding, and Causality" (Dr. Fitzgerald)  Quiz: Submit Online by February 28

Case Study # 2  March 3  March 10  Readings: TBA  Due Date: By March 3  Case Studies Area: Case Study Questions for Discussion Leaders Start Date: By March 4; Open Forum for Entire Class Start Date: March 8; End Date: March 9; In-Class Discussion: March 10

Special Topics # 1 - Biomarkers  March 12  March 12  Readings: TBA  Due Date: By March 12  Key Concepts: "Biomarkers" (Dr. Bloom)

Spring Break  March 17  March 21  No Class

Case Study # 3  March 24  March 31  Readings: TBA  Due Date: By March 24  Case Studies Area: Case Study Questions for Discussion Leaders Start Date: By March 25; Open Forum for Entire Class Start Date: March 26; End Date: March 30; In-Class Discussion: March 31  Draft of Section 1 of Paper Due on April 4

Special Topics # 2  April 2  April 2  Readings: Checkoway, Chapt 8  Due Date: April 2  Key Concepts: "Occupational Health Surveillance" (Dr. Gelberg)

Special Topics # 3  April 7  April 7  Readings: TBA  Due Date: April 7  Key Concepts: "Industrial Hygiene" (Ms. Zhu and Mr. DePersis)

Special Topics # 4  April 9  April 9  Readings: Baker, Chapt 9  Due Date: April 2  Key Concepts: "Environmental Health Surveillance" (Mr. Talbot)

Passover Break  April 14  April 14  No Class

Special Topics # 5  April 16  April 16  Readings: Baker, Chapt 15  Due Date: April 16  Key Concepts: "Climate Change" (Dr. Lin)

Easter Break  April 21  April 21  No Class

Case Study # 4  April 23  April 30  Readings: TBA, Due Date: April 23  Case Studies Area: Case Study Questions for Discussion Leaders Start Date: By April 24; Open Forum for Entire Class Start Date: April 25; End Date: April 29; In-Class Discussion: April 30

Class Presentations  May 5  May 7  Final Papers Due May 11 for All Students

Ask a Question

Ask a Question is where you may post questions about course content, procedures, deadlines. Either the instructors or one of your classmates will be able to respond to your questions. Please be sure to make reference to the nature of your question in the Subject field.
Course Directors:

John D. Paccione, Ch.E, Ph.D., P.E.
Assistant Professor, Department of Environmental Health Sciences
Corning Tower, Room 1119, Albany, NY 12237; (518) 402-7650,
Email: jdp07@health.ny.gov or john.paccione@health.ny.gov

Lloyd R. Wilson, Ph.D.
Assistant Professor, Department of Environmental Health Sciences
Corning Tower, Room 1119, Albany, NY 12237; (518) 402-7650,
Email: lrw03@health.ny.gov or lloyd.wilson@health.ny.gov

Participants:

Katherine Alben, Ph.D.
Assistant Professor, Department of Environmental Health Sciences
Wadsworth Center
Albany, NY 12237;

David M. Dziewulski, Ph.D.
Associate Research Professor, Department of Environmental Health Sciences
Corning Tower, Room 1119, Albany, NY 12237; (518) 402-7650,
Email: dmd14@health.ny.gov or david.dziewulski@health.ny.gov

Office Hours: By appointment.

Prerequisites: Undergraduate chemistry, mathematics (calculus preferred)

Course Description: This course is an introduction to the interaction between water quality and public health. The three main objectives are for the student to learn and understand the following aspects that relate water quality to public health:

1. Constituents of concern that may be found in water
2. Rules that regulate constituents of concern
3. Unit operations that are used to address the constituents that affect public health

The focus of the course is potable water, but a small section will be devoted to recreational water as well. The course will cover the entire vertical spectrum of water from its sources to the means of bringing it to the consumer.

The course will include a significant review of federal rules that regulate drinking water quality. The review of the regulations will include a discussion of how federal rules are implemented into
state practices. The section on recreational water will include a case study on how a rules is developed beginning with the occurrence of a problem, the public health response, the application of engineering and science to address the problem, and concluding with the development of a regulation that was promulgated to reduce the likelihood of such an occurrence from happening again. This case study will be discussed as an analog of how other rules are developed. The review of articles will provide students with the opportunity to develop a wider understanding of water quality as it pertains to public health and the means to demonstrate critical thinking.

**Course Objectives:** Students who complete this course will be able to:

- Understand rules and regulations that are intended to protect public health from water borne diseases and illnesses
- Communicate with water treatment experts and engineers
- Develop a rule based on scientific understanding
- Develop meaningful enforcement strategies

The student will develop and understanding of the following ideas:

- Understanding of how water quality affects public health (biological and chemical)
- Rulemaking that is used to protect public health from water borne contaminants and organisms
- Understanding of how water is protected and treated
- Sampling and analytical methods used for operations
- Enforcement and regulation processes to ensure rules are met by water purveyors

**Competencies:** This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:

- Become part of a public health team, using scientific knowledge and communication skills to solve public health problems.
- Acquire basic and advanced knowledge in selected concentrations.
- Read, critically evaluate and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained.
- Have a broad knowledge of the field of environmental health including an understanding of the interaction of principles contained in fundamental environmental chemistry, biology, toxicology, epidemiology and general environmental health. Using this fundamental knowledge the students will then develop a refined knowledge related to their particular field of study within environmental or occupational health.
- Assess risks from either environmental or occupational exposures and identify measures to mitigate the risks.
**Course Reading:** We will be using the book “Water Quality & Public Health” by Crittenden et al, as a textbook. Additional required class readings will be posted on the Blackboard course page. The course will also refer to federal and state rules that will be provided to the students either in soft or hard copy as needed.

**Grading scheme:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Fraction of Total Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examinations</td>
<td>2</td>
<td>20% each</td>
</tr>
<tr>
<td>Final examination</td>
<td>1</td>
<td>20%</td>
</tr>
<tr>
<td>Report &amp; Presentation</td>
<td>1 &amp; 1</td>
<td>15% &amp; 10%</td>
</tr>
<tr>
<td>Computer simulation</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td>Paper summaries</td>
<td>TBD</td>
<td>5% Total</td>
</tr>
</tbody>
</table>

**Examinations (3):**

- Examinations (20% each): There will be two (2) examinations in class; each will be approximately 80 minutes duration. Each examination will be based on the material covered that is designated for that section of the course.

- Final examination (20%): A final written examination will be provided to the students either the last day of class or during the exam period.

**Paper review (5% total)** must be 1-2 pages, double spaced, using 1 inch margins and 12 point font (analogous to an abstract). The paper reviews provide the student with an opportunity to read and critique the ideas presented in the papers. The focus of this work is for the student to develop supported opinions that are defensible. The format of the paper review is as follows:
  - Name of student
  - Date of review
  - Title of Paper
  - Title of Review
  - Main idea of the paper in 2-5 sentences
  - Review of the ideas in terms of whether or not the student agrees with what has been presented in the paper
  - Conclusion of the review

**Report and Paper presentations (15% and 10%)** The report will examine an aspect of how water quality affects public health. The page limit for this paper is to five pages of text plus cover pages and bibliography. The report represents 15% of the total course grade. The presentation for each student will constitute 10% of the total grade and be limited to 20 minutes in length. The oral portion will consist of a pre prepared PowerPoint presentation. The student will be required to submit the presentation in PDF format the instructor following the class and may possibly be posted on the course Blackboard course page. A standard template will be used to grade all presentations, and will be available to registered students either on the Blackboard system or on the course website.
Grading policy:

<table>
<thead>
<tr>
<th>Numerical grade</th>
<th>Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>95-100 %</td>
<td>A</td>
</tr>
<tr>
<td>90-94 %</td>
<td>A-</td>
</tr>
<tr>
<td>87-89 %</td>
<td>B+</td>
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<td>C+</td>
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<td>65-69%</td>
<td>D</td>
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Course Policies:

- This course is lecture oriented and therefore attendance is very important; if you are unable to attend class due to illness or a professional obligation please email or call the appropriate instructor if you are scheduled to take an exam or make a presentation. This will provide ample time to make other arrangements.

All students need to be aware of the University at Albany’s standards of conduct as described in the booklet *Community Rights and Responsibilities* (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic integrity will be strictly enforced. Any violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the *Community Rights & Responsibilities* (see course information for a copy) will result in a failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany judicial system.
Chromatographic Methods  
Fall 2014, Course: EHS 621  
Mondays and Wednesdays, 1:00-2:30 PM  
Wadsworth Center, Empire State Plaza, Room B-760 (B-Level)

Course Director:  
Buu N. Tran, Ph.D., Assistant Professor, Departments of Environmental Health Sciences,  
University at Albany School of Public Health,  
Wadsworth Center, Empire State Plaza, Biggs Lab., Rm D-408; (518) 474-7799,  
Email: btran@wadsworth.org

Office Hrs: By appointment.

Prerequisites: Undergraduate courses in organic and/or analytical chemistry, EHS-525.

Course Description: The course will familiarize students with the use of established as well as emerging chromatographic techniques in a public health laboratory environment. Students will be presented with in-depth discussions and practical applications of a variety of chromatographic systems including ion chromatography, solid phase extraction (SPE), solid phase micro-extraction (SPME), gas chromatography coupled mass spectrometry (GC-MS), liquid chromatography and ultra-performance liquid chromatography coupled tandem mass spectrometry (LC-MS/MS, UPLC-MS/MS), and inductively coupled mass spectrometry (ICP-MS). Lectures will provide examples of how each of these chromatographic techniques has been employed to address environmental samples and real life public health problems. Instructors will also assign students relevant scientific publications for discussion.

Course Objectives: Students who complete this course will be able to:

1. Understand different techniques of chromatographic methods and instrumentations that can be apply to the analysis of the environmental and biological samples.
2. Develop a strategy and analytical method for monitoring of pollutants in air, water, soil and biological matrices.
3. Identify sources, chemodynamics and fate of environmental pollutants in ecosystems.
4. Assess the exposure of the human to environmental chemicals and toxic substances through biomonitoring methods.

Course Competencies: This course teaches topics and skills that relate to competencies considered critical by the Association of Schools of Public Health (ASPH) for all MS, PhD and MPH graduate students (http://www.asph.org/publication/MPH_Core_Competency_Model/index.html), including:

1. Acquire broad knowledge of the field of Environmental Chemistry including development of methods for ultra-trace analysis of pollutants in air, water, soil and biological matrices;
understanding of sources, chemodynamics and fate of environmental pollutants in ecosystems.

2. Understand the methods used to assess human and environmental exposure pathways of environmental pollutants and quantitative analysis of exposure levels; environmental processes that affect the dynamics and fate pollutants; multimedia monitoring and modeling, biomonitoring and bioaccumulation of toxic chemicals. Students should be familiar with global and regional environmental problems and be able to build a more detailed knowledge of those particular aspects of Environmental Chemistry that interest them.

3. Be familiar with the research literature, analytical techniques, and applications of those techniques in Environmental Chemistry. Interpret and critically analyze the data on environmental chemical analysis; conduct research independently and be able to perform basic statistical analysis of data generated from laboratory or field studies.

Course documents: will be provided by instructors.

Grades: Final course grade, from A to D, will be based on Mid-term and Final Exam.

A (95-100%); A- (90-94%); B+ (86-89%); B (81-85%); B- (76-80%); C+ (71-75%); C (61-70%); D (50-60%).

Mid-term Exam 50%
Final Exam 50%

Course Policies:

All students need to follow of the University's Standards of Academic Integrity (http://www.albany.edu/graduatebulletin/requirements_degree.htm#standards_integrity) as described in Graduate Bulletin as follows:

“Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree.” (University’s Standards of Academic Integrity Policy, Fall 2013)
## EHS 621: Chromatographic Methods
### Fall 2014

Course Outline

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep-3</td>
<td>Introduction LOAC/LINC Lab Tour</td>
<td>Tran</td>
</tr>
<tr>
<td>Sep-8</td>
<td>Bioanalytical Sample Preparation/Applications</td>
<td>Tran</td>
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<tr>
<td>Sep-10</td>
<td>Applications of Chromatography-MS in FERN</td>
<td>Tran</td>
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<tr>
<td>Sep-15</td>
<td>Applications of Chromatography-MS in FERN</td>
<td>Tran</td>
</tr>
<tr>
<td>Sep-17</td>
<td>GC/MS, LC/MS Derivatization Chemistry</td>
<td>Spink</td>
</tr>
<tr>
<td>Sep-22</td>
<td>GC/GC, UPLC</td>
<td>Spink</td>
</tr>
<tr>
<td>Sep-24</td>
<td>GC/MS, LC/MS Applications</td>
<td>Spink</td>
</tr>
<tr>
<td>Sep-29</td>
<td>GC/MS, LC/MS Applications</td>
<td>Spink</td>
</tr>
<tr>
<td>Oct-1</td>
<td>Application of Chromatography to screen newborns for hemoglobinopathies</td>
<td>Orsini</td>
</tr>
<tr>
<td>Oct-6</td>
<td>Application of chromatography to screen newborns for congenital adrenal hyperplasia</td>
<td>Orsini</td>
</tr>
<tr>
<td>Oct-8</td>
<td>Application of Chromatography to screen newborns for lysosomal storage disorders</td>
<td>Orsini</td>
</tr>
<tr>
<td>Oct-15</td>
<td>SPME: Introduction and application</td>
<td>Lu</td>
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<tr>
<td>Oct-20</td>
<td>Applications of high resolution mass spectrometry in PAHs biomonitoring</td>
<td>Lu</td>
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<tr>
<td>Oct-22</td>
<td>Applications of UHPLC-MS/MS in urine illegal drugs monitoring</td>
<td>Lu</td>
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<tr>
<td>Oct-27</td>
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<td>Tran</td>
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<tr>
<td>Oct-29</td>
<td>UPLC Applications: Carotenoids/chlorophylls/retinoids/extracts of biological specimens</td>
<td>Alben</td>
</tr>
<tr>
<td>Nov-3</td>
<td>LC APCI Applications: Lipidomics/metabolomics</td>
<td>Alben</td>
</tr>
<tr>
<td>Nov-5</td>
<td>Data systems, data processing, data management</td>
<td>Alben</td>
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<tr>
<td>Nov-10</td>
<td>LC-PDA/FI/MS methods for algal toxins</td>
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<tr>
<td>Nov-12</td>
<td>LC-PDA/FI/MS methods for polar phospholipids</td>
<td>Alben</td>
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<td>Nov-17</td>
<td>ICP-OES and ICP-MS in Inorganic Environmental samples</td>
<td>Swami</td>
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<tr>
<td>Nov-19</td>
<td>Applications</td>
<td>Swami</td>
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<tr>
<td>Nov-24</td>
<td>Ion-Chromatography Principles</td>
<td>Khwaja/Hussain</td>
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<tr>
<td>Dec-1</td>
<td>Ion-Chromatography for Inorganic Species</td>
<td>Khwaja/Hussain</td>
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<td>Dec-3</td>
<td>Ion-Chromatography for Organic Species</td>
<td>Khwaja/Hussain</td>
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<tr>
<td>Dec-8</td>
<td>HPLC for Organic Species</td>
<td>Khwaja/Hussain</td>
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<tr>
<td>Dec-10</td>
<td>Applications</td>
<td>Khwaja/Hussain</td>
</tr>
<tr>
<td>Dec-15</td>
<td>Final Exam</td>
<td>Tran</td>
</tr>
</tbody>
</table>
## Course Instructor Contact Info

<table>
<thead>
<tr>
<th>Instructors</th>
<th>ESP Room#</th>
<th>Phone</th>
<th>email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Katherine Alben Ph.D.</td>
<td>D-300</td>
<td>473-0774</td>
<td><a href="mailto:alben@wadsworth.org">alben@wadsworth.org</a></td>
</tr>
<tr>
<td>Mirza Hussain Ph.D.</td>
<td>D-308</td>
<td>473-1226</td>
<td><a href="mailto:mmh07@health.state.ny.us">mmh07@health.state.ny.us</a></td>
</tr>
<tr>
<td>Haider Khwaja Ph.D.</td>
<td>D-308</td>
<td>474-0516</td>
<td><a href="mailto:khwaja@wadsworth.org">khwaja@wadsworth.org</a></td>
</tr>
<tr>
<td>Jimmy Lu Ph.D.</td>
<td>D-218</td>
<td>473-7299</td>
<td><a href="mailto:Lus@wadsworth.org">Lus@wadsworth.org</a></td>
</tr>
<tr>
<td>Joseph Orsini Ph.D.</td>
<td>DAI-5080</td>
<td>473-8366</td>
<td><a href="mailto:jjo01@health.state.ny.us">jjo01@health.state.ny.us</a></td>
</tr>
<tr>
<td>David Spink Ph.D.</td>
<td>D-531</td>
<td>486-2530</td>
<td><a href="mailto:david.spink@wadsworth.org">david.spink@wadsworth.org</a></td>
</tr>
<tr>
<td>Kamal Swami Ph.D.</td>
<td>D305</td>
<td>474-4934</td>
<td><a href="mailto:swami@wadsworth.org">swami@wadsworth.org</a></td>
</tr>
<tr>
<td>Buu Tran Ph.D.</td>
<td>D-408</td>
<td>474-7799</td>
<td><a href="mailto:btran@wadsworth.org">btran@wadsworth.org</a></td>
</tr>
</tbody>
</table>
EHS 622 – Mass Spectrometry

Location and Meeting Time: Monday and Wednesday, 10:00 – 11:20 AM
C530 Biggs Laboratory, Wadsworth Center, Empire State Plaza

Course Director: David Spink, Ph.D.
Office: D531 Wadsworth Center
Phone: 486-2530
Email: spink@wadsworth.org
Office Hours: 2:00-3:30 PM Tuesday and Thursdays or by appointment

Course Description: EHT 622 is a comprehensive course covering the principles, techniques, and applications of mass spectrometry. The course covers modern techniques of ionization, mass analysis, and ion detection, with emphasis on interpretation of spectra and application of mass spectrometry to environmental and biomedical problems and current research topics. The students will gain knowledge and appreciation of how mass spectrometry is a vital technique in environmental monitoring and assessment, the evaluation of human exposure to environmental agents and determination of the toxic and endocrine-disrupting effects of selected environmental contaminants.

Prerequisites: EHT 520 – Principles of Environmental Chemistry or EHT 530 – Principles of Toxicology. Students who have an appropriate undergraduate background in organic chemistry and physics may also be admitted by consent of the course director.

Course Grading: Course grading is A through E. There will be a midterm exam and a final exam, each accounting for 30% of the final grade. Students will be required to make an in-class presentation of a current research paper and lead the discussion of the paper. This presentation will be worth 20% of the course grade. A term paper (10 or more double spaced pages with 15 or more references) on a current topic in mass spectrometry will be worth 20% of the final grade.

Course Requirements:
Attendance: Attendance and class participation are required.
Text and Reading: There will be no assigned textbook for the course. Assigned readings will include handouts given in class and assigned papers from the current scientific literature (Journal of the American Society for Mass Spectrometry, Journal of Mass Spectrometry, Analytical Chemistry, Environmental Toxicology and Chemistry, Environmental Science and Technology). For additional (unassigned) readings, the following books will be on reserve in the Dickerman Library.


EHT 622 Mass Spectrometry - Learning Objectives

The overall objective of the course is for the students to acquire an understanding of the principals and applications of mass spectrometry in environmental and biomedical research. Students will become familiar with different types of instrumentation, various methods for ionization and mass analysis, techniques for interfacing chromatographic separation techniques with mass spectrometry, and methods for quantitative analysis. This course will allow the students to understand critically and evaluate mass spectrometric data reported in the scientific literature and to establish a framework for the use of mass spectrometry in their own research and professional careers. Our goal is to provide the students with the knowledge of how environmental mass spectrometric data is obtained, how it is interpreted and what its limitations are.

Specific Objectives of the Course are to:

- Familiarize the student with the commonly used methods of ionization, including electron, chemical, desorption, electrospray, and atmospheric pressure chemical ionization.
- Discuss the techniques and instrumentation for mass analysis, including electric and magnetic sectors, quadrupole mass filters, ion traps, ion cyclotrons, and time of flight instruments.
- Provide the students with an understanding of how structural determinations of small organic molecules that are common environmental contaminants are made, as well as how large biomolecules are analyzed by using mass spectrometry through analysis of ion fragmentation patterns.
- Discuss in detail the combined techniques of gas chromatography-mass spectrometry and liquid chromatography-mass spectrometry and their utility in environmental science.
- Present the development of quantitative mass spectrometry by use of stable isotope dilution techniques.
- Familiarize the students with the use of tandem mass spectrometry in structural elucidation and quantitative analysis.

Course Competencies

This course teaches topics and skills that relate to competencies considered critical by the Association of Schools of Public Health (ASPH) for all MPH graduates (http://www.asph.org/publication/MPH_Core_Competency_Model/index.html), including:

Environmental Health Sciences Competencies:
1) Describe the direct and indirect human ecological and safety effects of major environmental and occupational agents. Mass spectrometry is widely used in ecological studies and assessment of human exposures.
3) Describe federal and state regulatory programs, guidelines, and authorities that control environmental health issues. Many analytical methods required by state and federal governments for the determination of environmental toxicants employ mass spectrometry.
5) Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety. The analysis of environmental contaminants by mass spectrometry often precedes or is integral in the processes of assessment, prevention and control of environmental hazards.
6) Explain the general mechanisms of toxicity in eliciting a toxic response to various environmental exposures. Mass spectrometric analysis of large biomolecules provides important
data that may reveal the molecular targets of toxic environmental contaminants and their metabolites.

**EHS 622 - Mass Spectrometry - Syllabus**

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
<th>Lecturer</th>
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<tr>
<td>1</td>
<td>Introduction to MS - magnetic sector instruments</td>
<td>Spink</td>
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<tr>
<td>2</td>
<td>Ion cyclotron and time-of-flight instruments</td>
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<td>Feb 3</td>
<td>Quadrupoles and tandem MS instruments</td>
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<td>4</td>
<td>Inductively Coupled Plasma MS</td>
<td>Arnason</td>
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<td>5</td>
<td>Inductively Coupled Plasma MS</td>
<td>Arnason</td>
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<td>6</td>
<td>Ion traps</td>
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<td>7</td>
<td>Liquid Chromatography MS interfaces</td>
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<td>9</td>
<td>Linear ion trap and Oribtrap instruments</td>
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<td>10</td>
<td>Desorption-ionization MS</td>
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<td>11</td>
<td>Desorption-ionization MS, MS of Proteins</td>
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<td>12</td>
<td>MS of Proteins, Proteomics</td>
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<td>13</td>
<td>Interpretation of EI Mass Spectra</td>
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<td>14</td>
<td>Gas Chromatography-MS, Chemical Derivatization</td>
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<td>Gas Chromatography-MS</td>
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<td>16</td>
<td>Comprehensive (GCxGC)-MS Metabolomics</td>
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<td>17</td>
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<td>Student Presentations</td>
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<td>19</td>
<td>Mass Spectrometry in Newborn Screening</td>
<td>Morrissey</td>
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<tr>
<td>20</td>
<td>Mass Spectrometry of DNA adducts</td>
<td>Gu</td>
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<td>21</td>
<td>Chemical Ionization MS</td>
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<tr>
<td>22</td>
<td>Chemical Ionization MS</td>
<td>Spink</td>
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**MIDTERM EXAM**

**FINAL EXAM**

**Academic Integrity**

“*Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree.”* (University’s Standards of Academic Integrity Policy, Fall 2013)
REPRODUCTIVE ENVIRONMENTAL HEALTH
Spring 2014, Course: HEHS626
Tuesday, 9:00 A.M. to 11:40 A.M.
East Campus George Education Center (GEC) Classroom #2

Course Director:
Michael S. Bloom, Ph.D., M.S.  Associate Professor, Departments of Environmental Health Sciences and Epidemiology and Biostatistics, University at Albany School of Public Health, GEC Rm. 157 (in the Dept. of Epidemiology & Biostatistics); (518) 473-1821, mbloom@albany.edu

Office Hrs: By appointment.

Prerequisites: Coursework equivalent to EHS 590, EPI 500/501 and BMS 505; or instructor’s permission.

Course Description: This course will review the impact of exposure to various classes of environmental pollutants on human reproduction throughout the life course including, fecundity and fertility, pregnancy, infant and child development, and adult reproductive health. It combines a ‘traditional’ didactic format with weekly student-led discussions of the literature; the intent is to offer you a comprehensive technical background as well as to the opportunity to develop and refine your utilization and interpretation of the literature. This will be a highly interactive course, and will include a substantial amount of literature research and evaluation. Lecture notes and readings can be found on the Blackboard course page, which is also used to submit and distribute all class assignments. During our exploration of myriad topics comprising reproductive environmental health, you will gain an appreciation for and an understanding of the impact that environmental toxicants have on human reproduction, as well as intervention strategies to reduce individual risk.

Course Objectives: Students who complete this course will be able to:
1. Define ‘reproductive environmental health’ and discuss the impact on modern societies;
2. Describe the fundamental processes of human reproduction including gametogenesis, fertilization, pregnancy, embryogenesis, fetal development, postnatal development and puberty;
3. Identify ‘critical windows’ for reproductive toxicity and describe the relevance to reproductive health;
4. Recognize methodologic issues specific to epidemiologic studies of human reproduction;
5. Demonstrate the impacts of environmental exposures on the various components of human reproduction and development;
6. Summarize issues specific to assisted reproductive technologies, including in vitro fertilization, the impact of environmental exposures on this process and the relevance of study results to the population at large; and
7. Identify, retrieve, interpret and synthesize peer-reviewed scientific literature related to human reproduction and environmental exposures.
**Competencies:** This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:

- Become part of a public health team, using scientific knowledge and communication skills to solve public health problems.
- Acquire basic and advanced knowledge in selected concentrations.
- Read, critically evaluate and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained.
- Have a broad knowledge of the field of environmental health including an understanding of the interaction of principles contained in fundamental environmental chemistry, biology, toxicology, epidemiology and general environmental health. Using this fundamental knowledge the students will then develop a refined knowledge related to their particular field of study within environmental or occupational health.
- Assess risks from either environmental or occupational exposures and identify measures to mitigate the risks.

**Course Reading:** We will be using the book “Generations at Risk: Reproductive Health and the Environment” by Schettler, Solomon, Valenti and Huddle, 1999, for several required readings. Additional required class readings will be posted on the Blackboard course page.

**Grades:** Your final course grade will be based on in class participation (including paper presentations), nine weekly literature assignments submitted for grading, and a final examination.

**Weekly literature retrieval and summary (40%):** Starting the Sunday preceding the 5th class meeting (2/23/14), you will have eight weekly written paper summaries due Sunday at noon preceding each Tuesday class. Papers will address an assigned chemical ‘family’ and reproductive endpoint. You will be expected to submit your paper summary, as well as a .pdf copy of your paper using the Blackboard assignments tool; emailed assignments will not be accepted. Papers will be posted on the Blackboard course page for access by all of the students in the class.

- Paper summaries (20%) must be 1-2 pages, double spaced, using 1 inch margins and 12 point font (analogous to an abstract). Paper summaries will describe the critical aspects of the your selected paper using bullet-points in a structured format, including: 1. a title of your own succinctly summarizing the paper; 2. the study design; 3. the study sample or study population; 4. important background information/the rationale for the study; 5. a brief description of the methodology, including the working study hypothesis, basic components of data collection and the basic components of the data analysis; 6. a general summary of the study results; 7. your opinion with respect to the overall quality of the paper, the major strength of the study, and the major limitation of the study; and 8. the complete citation for the study. An example of the required format is provided as the “EXAMPLE PAPER SUMMARY” at the end of this syllabus. A rubric will be used to grade all paper assignments, and is available to you on the course website.

- Paper presentations (20%) will be 30-45 minutes in length (contingent on the number of enrolled students), using a prepared PowerPoint file; you will have one or more presentations again contingent on the number of students in the class. PowerPoint files must be submitted
to the instructor following the class and will be posted as .pdf files on the course Blackboard course page. A rubric will be used to grade all presentations, and is available to you on the course website.

**Class participation (20%):** Active and on-going participation in each week’s topic discussions is expected and will comprise a substantial component of your final course grade (topic discussions will begin in week 5). You should be prepared to discuss the relevance of your weekly paper in relation to the student presentation and in the context of the assigned topic area. This includes attending class, arriving on time at the beginning of class and after breaks, completing all assigned readings before class, and contributing thoughtfully to class discussions. Class participation will be graded as follows for each session: 0=absent; 1=present and adequate participation; 2=present and thoughtful participation that reflects good familiarity with the readings and advances and elevates the class discussion. However, three or more missed classes during the semester will automatically result in loss of half of the total class participation points for the semester.

**In-class quizzes (20%, 10% each):** There will be two open book/notes quizzes in class; each will be approximately 80 minutes duration; the first will be held on 2/18 and will address fundamental background course material and readings covered up to that point; the second will take place on the last day of class (5/6) and will address issues related to environmental risk factors in course material and reading covered since the 1st quiz.

**Final examination (20%):** A take home written final examination will be administered through the Blackboard course page. The final exam will be cumulative and will address all of the material covered throughout the semester. Students are encouraged to utilize the class resources posted on the Blackboard course page when completing the final exam.

**Final Course Grades:**
A (95-100%); A- (90-94%); B+ (86-89%); B (81-85%); B- (76-80%); C+ (71-75%); C (61-70%); D (50-60%); E (<50%)

**Course Policies:**

- As this course is discussion oriented, attendance is mandatory; if you are unable to attend class due to illness or a professional obligation please contact the instructor as soon as possible.
- All students need to be aware of the University at Albany's standards of conduct as described in the booklet *Community Rights and Responsibilities* (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic integrity will be strictly enforced. Any
violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the Community Rights & Responsibilities (see course information for a copy) will result in a failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany judicial system
# Course Schedule: Class Topics, Reading Assignments, & Exams

The proposed course outline is subject to change contingent on circumstances.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Date/s</th>
<th>Reading Assignments Due</th>
<th>Class assignments</th>
<th>Student presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to reproductive environmental health lecture &amp; Reproductive and developmental physiology, part 1 lecture</td>
<td>1/28</td>
<td>ACOG &amp; ASRM, 2013; Guillette &amp; Iguchi, 2012; Norwitz et al., 2001; Schettler et al. 1999 (Chpt. 1); Sutton et al., 2010; Sutton et al., 2012</td>
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<tr>
<td>2</td>
<td>Introduction to reproductive epidemiology lecture and Reproductive &amp; developmental physiology, part 2 lecture (Guest speaker, Larry Schell, PhD).</td>
<td>2/4</td>
<td>Bloom &amp; Vena, In press; Hess et al., 2008; Schettler et al. 1999 (Chpts. 2 &amp; 7); Schell &amp; Gallo, 2010</td>
<td>-</td>
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<tr>
<td>3</td>
<td>Reproductive &amp; developmental physiology, part 3 lecture (Guest speaker, Martin Tenniswood, PhD) and Assisted reproductive technologies lecture</td>
<td>2/11</td>
<td>Barbieri &amp; Hornstein, 2004</td>
<td>-</td>
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<td>4</td>
<td>Quiz #1 &amp; Reproduction and metals lecture</td>
<td>2/18</td>
<td>Dyer, 2007; Fujimoto &amp; Bloom, in press (pgs. 2-3, 16-19); Schettler et al., 1999 (pgs. 51-72); Vahter, 2009</td>
<td>Paper summary #1 due 2/23, 12 PM</td>
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<td>5</td>
<td>Pregnancy loss and metals discussion (1) &amp; Reproduction and phthalates lecture</td>
<td>2/25</td>
<td>Hauser &amp; Calafat, 2005; Schettler et al., 1999 (pgs. 181-182)</td>
<td>Paper summary #2 due 3/2, 12 PM</td>
<td>Celeste Butts</td>
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<td>6</td>
<td>No class today</td>
<td>3/4</td>
<td>-</td>
<td>-</td>
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<tr>
<td>7</td>
<td>Sexual development and phthalates discussion (2) &amp; Reproduction and legacy POPs lecture</td>
<td>3/11</td>
<td>Fujimoto &amp; Bloom, in press (pgs. 9-13); Meeker &amp; Hauser, 2010; Mendola, et al., 2008; Schettler et al., 1999 (pgs. 151-169)</td>
<td>Paper summary #3 due 3/16, 12 PM</td>
<td>Lauren Howland</td>
</tr>
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<td>8</td>
<td>No class, spring break</td>
<td>3/18</td>
<td>-</td>
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<td>9</td>
<td>Women’s reproduction health and legacy POPs discussion (3) &amp; Reproduction and emerging POPs lecture</td>
<td>3/25</td>
<td>Fujimoto &amp; Bloom, in press (pgs. 13-16)</td>
<td>Paper summary #4 due 3/30, 12 PM</td>
<td>Stephanie Wilkinson</td>
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<td>10</td>
<td>TBD reproduction and emerging POPs discussion (4) &amp; Reproduction and bisphenol A (BPA) lecture</td>
<td>4/1</td>
<td>Fujimoto &amp; Bloom, in press (pgs. 7-9); Hofer et al., 2004; Rochester, 2013; Schettler et al., 1999 (pgs. 180-181)</td>
<td>Paper summary #5 due 4/6, 12 PM</td>
<td>Alicia Lee</td>
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<td>11</td>
<td>TBD reproduction and BPA discussion (5) &amp; Reproduction and pesticides lecture (Guest speaker, Erin Bell, PhD)</td>
<td>4/8</td>
<td>Schettler et al., 1999 (pgs. 107-125)</td>
<td>Paper summary #6 due 4/13 12 PM</td>
<td>Allie Kline</td>
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<td>12</td>
<td>No class, holiday</td>
<td>4/15</td>
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<td></td>
<td>TBD reproduction and pesticides discussion (6) &amp; Reproduction and air pollutants lecture (Guest speaker, Hyunok Choi, PhD)</td>
<td>4/22</td>
<td>Rennie et al., 2011</td>
<td>Paper summary #7 due 4/27, 12 PM</td>
<td>Wendy Strollo</td>
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<tr>
<td>14</td>
<td>TBD reproduction and air pollutants discussion (7) &amp; Reproduction and mixtures lecture (Guest speaker, David Carpenter, MD)</td>
<td>4/29</td>
<td>Carpenter et al., 2002</td>
<td>Paper summary #8 due 5/4, 12 PM</td>
<td>Amanda Tarrier</td>
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<tr>
<td>15</td>
<td>Quiz #2 &amp; TBD reproduction and mixtures discussion (8)</td>
<td>5/6</td>
<td>-</td>
<td>-</td>
<td>Rebecca Lewis</td>
</tr>
<tr>
<td></td>
<td>Final exam assigned online</td>
<td>5/10</td>
<td>-</td>
<td>Final exam due 5/14, 5 PM</td>
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</tr>
</tbody>
</table>

TBD, to be determined.
EXAMPLE PAPER SUMMARY:

Trace elements in blood may impact female fecundability, a study of sport fish consumers

Study design: Epidemiologic study, prospective cohort design with pre-conception enrollment.

Study sample/population: 99 female anglers and partners of anglers in western and central New York State who discontinued conception with the intent on becoming pregnant.

Background: Environmental factors, including trace toxic metals may interfere with human reproduction and excesses or deficiencies of trace essential elements may do so as well. This study was undertaken to evaluate the effects of ‘background-level’ non-occupational exposures to three toxic elements (arsenic, cadmium, lead) and four essential elements (magnesium, nickel, selenium, zinc).

Methods: The authors hypothesized that high levels of toxic elements and low levels of essential elements would delay pregnancy. Women provided a blood specimen at the start of the study and were followed for up to 12 months of unprotected intercourse, with completion of monthly at home pregnancy tests and daily diaries to record health-related behaviors. Trace elements were measured in blood specimens and women returned daily diary cards by mail on a monthly basis to capture data on important covariates and pregnancy testing. A Cox-proportional hazards regression model for discrete-time data was used to evaluate the time to a positive pregnancy test as a function of baseline levels of trace elements in blood. Women were followed up to pregnancy or censored at 12 months.

Results: Levels of trace elements were low. No association was detected for toxic elements, yet magnesium increased pregnancy and there was a suggestion for zinc to decrease pregnancy. Little research has been conducted with respect to female fecundity, magnesium and zinc and so these results suggest their importance for further consideration.
Opinion: A well-written and well-conducted study overall. There are few prospective pregnancy studies with pre-conception enrollment. However, use of only baseline blood elements likely resulted in exposure measurement misclassification and may thus have reduced the investigators’ ability to detect associations. Furthermore, the study sample comprised female anglers or the partners of male anglers and the study results may not be generalizable to other groups.

Citation: Bloom MS, Buck Louis GM, Sundaram R, Kostyniak PJ, Jain J. Associations between blood metals and fecundity among women residing in New York State. Reproductive Toxicology 2011:2:158-163.
EHS 629: Protocol Development and Grant Writing  
Fall, 2014: Thursdays: 1:00PM - 3:50PM  
School of Public Health, East Campus, Room C5

Course Faculty:  
Erin M. Bell, SPH Rm. 155, 402-0375, ebell@albany.edu

Prerequisites: This course is open to all DrPh and PhD students in the School of Public Health. Students must have completed their required core courses for their respective programs.

Office Hours:  
By Appointment

Course Description:  
This course is open to all DrPh and PhD students in the School of Public Health. This course will review methods for developing research proposals in the population sciences for submission for grant funding. The course will involve in-depth discussion of hypothesis and conceptual model development, exposure and outcome assessment methods, study designs and bias assessment and how these factors influence the decision making process when developing a proposal. Application of these methods will be evaluated through the completion of written critiques of the peer-reviewed literature, in-class discussions and the preparation of a grant proposal as a culminating activity. Finally, given that the best way to assess whether you have mastered material is to teach the subject matter, each student is required to prepare one lecture based on a statistical, design or exposure/outcome assessment method relevant to their grant proposal.

Learning Objectives:  
1. To understand the process for designing a research proposal.  
2. To fully understand and discuss the impact of study design, outcome and exposure measurement and data collection on study bias and interpretation of results.  
3. To be able to describe and defend the choice of research tools (e.g. study design, outcome and exposure assessment and statistical methods) for a particular research proposal.  
4. Be familiar with the NIH process for writing and submitting research proposals. Be familiar with how other funding institutions may differ in their submission process.  
5. Be familiar with the process for developing budgets and compliance protocols for a research study.  
6. To know the guidelines for submitting research proposals at the University at Albany and how these may/may not differ at other institutions.  
7. To develop a well-written research proposal for grant funding in the NIH format (note that NIH was chosen given the frequency the SPH faculty submit to NIH).  
8. To develop and prepare a course lecture on a research method related to the proposal. Be able to design a proposal for an audience from multiple disciplines and address their s within public health.  
9. Be able to review and thoroughly discuss the methodological implications of studies described in peer-reviewed research manuscripts from multiple disciplines within public health.
**Competencies (PhD):**

Acquire advanced knowledge in the chosen field  
Read, critically evaluate, and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained  
Demonstrate a command of the fundamentals and current state of the discipline sufficient to prepare a written research proposal  
Develop problem solving skills through application of knowledge to a research problem in the chosen track  
Read, critically evaluate, and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained  
Present and orally defend knowledge gained in a public seminar

**Class Readings:**  
Articles and other readings will be assigned weekly and posted to the website. Please note, that readings and lecture topics may be adjusted slightly after grant proposal topics are chosen in order to accommodate and cover topics necessary for all subspecialties represented in class. Any adjustments will be thoroughly discussed in class and posted to the website.

**Required Textbooks:**  

**Suggested textbooks:**  

**Web-site:**  
Lecture notes, assignments, and other course materials will be posted on the Blackboard Learning System course web-site. Students registered for the class can access the course material by logging on to http://bls.its.albany.edu/webct/entryPageIns.dowebct or through the MyUAlbany link to Blackboard Learning System. Notes and readings will be posted as Adobe Acrobat files (i.e., with .pdf extensions).

**Grading:**

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
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<tr>
<td>Class Lecture</td>
<td>25%</td>
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<tr>
<td>Draft Specific Aims</td>
<td>5%</td>
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<tr>
<td>Draft Innovation and Significance</td>
<td>5%</td>
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<tr>
<td>Grant Proposal</td>
<td>30%</td>
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<tr>
<td>Class Discussions</td>
<td>25%</td>
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</table>

For each day an assignment is late, 10 points will be deducted from the assignment grade.
Academic dishonesty (please refer to the *Community Rights and Responsibilities* booklet) will not be tolerated and will lead to disciplinary action as deemed appropriate by the faculty and/or the University's judicial process.

**Courtesies:**
As a courtesy to your fellow students and faculty, the use of cell phones (including text messaging) is not allowed during class time.

Finally, please respect your fellow students, faculty and guest lecturers by conducting yourselves in a professional manner. Up to 5% may be deducted from the final grade if the student is unable to comply with this request.

Total score for the class:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>95-100</td>
<td>A</td>
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<tr>
<td>90-94</td>
<td>A-</td>
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<tr>
<td>87-89</td>
<td>B+</td>
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<td>84-86</td>
<td>B</td>
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<tr>
<td>80-83</td>
<td>B-</td>
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<tr>
<td>77-79</td>
<td>C+</td>
</tr>
<tr>
<td>74-76</td>
<td>C</td>
</tr>
<tr>
<td>70 or below</td>
<td>C-</td>
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</table>

**Homework:**
A two paragraph summary for each of the weekly article critiques will be due at the beginning of each lecture. Additional assignments will be announced in class.

**Class Discussions:**
Each student will be expected to lead two class discussions based on a recently peer-reviewed published article of their choice, one of which can be related to their research proposal they are developing in class. The student will be assigned dates for his or her discussion the first day of class. Dr. Bell will lead the first discussion. Each student will provide copies of their article and questions to the class 1 week prior to their scheduled discussion date. All students will prepare typed responses to the questions for the assigned discussion date and hand in their responses at the end of the discussion. The class discussion grade will be based on both the student's discussion leadership as well as their preparation for (with their written answers) and their participation in discussions led by their fellow students.

**Research Protocol and Grant Proposal:**
Each student will select, with the consent of the course instructor, a topic for a research grant proposal and must be approved by September 16. The Specific Aims draft for the grant proposal is due on September 30, the Significance and Innovation drafts are due October 14 and the project narrative draft is due on November 11. You will receive written feedback on all drafts. Instructions for the grant proposal are below and will be discussed further in class. The grant proposal is due on the last day of class (December 9). **Students are encouraged to pick a topic that will lead to their dissertation or DrPh project, although this is not required.**
**Lecture:**
The best way to assess whether you have mastered material is to teach the subject matter. Each student is required to prepare one lecture based on a statistical, design or exposure/outcome assessment method relevant to their grant proposal. We will discuss lecture topics in class. Your lecture will be 30 minutes in length followed by a 15 minute question and answer period. The lectures are scheduled for December 2 and December 9. The lecture will be graded on organization, design and use of overheads or other visual aids, clarity, timeliness and response to questions.

**Instructions for Research Grant Proposal:**
The NIH guidelines for grant applications will be used as a template for the grant proposal. The student will be responsible for completing the following sections:

1. Project Summary/Abstract
2. Project narrative
3. Specific Aims
4. Research Strategy
   a. Significance
   b. Innovation
5. Approach
   a. Research Methods and Design
6. Bibliography and References Cited

Other sections of a traditional NIH grant (e.g. Budgets, biographical sketch etc.) are not required due to time limitations, however we will review these components in class. Additional instructions and guidelines for writing grant proposals will be provided in class.
**August 26 - Class 1:**
1. Overview of Course
2. Grant writing
3. Critical Review of Article
4. Assignments for article discussions

**September 2 - Class 2:**
1. Article Discussion
2. Introduction to Exposure Assessment

Readings:
White, Armstrong and Saracci (WAS): Chapter 1 and 2
Gerin and Kapelewski (GK) (Chapter 1 and 2)

**September 9 - Class 3:**
1. Article Discussion
2. Questionnaire Development
3. Developing ideas and collaborations for grants
4. Developing a research question, hypothesis

Readings:
WAS: Chapter 6
GK: Chapter 3 and 4

**September 16 - Class 4: Topics Due**
1. Article Discussion
2. Personnel Interviews and Existing records/diaries
3. Specific Aims, Significance and Innovation
4. Conceptual Models

Readings:
WAS: Chapter 7 and 8
GK: Chapter 5

**September 23 - Class 5:**
1. Article Discussion
2. Biomarkers

Readings:
WAS: Chapter 9

**September 30 - Class 6: Specific Aims Due**
1. Article Discussion
2. Exposure Assessment

Readings:
WAS: Chapter 10
October 7 - Class 7:
1. Article Discussion
2. Response Rates
3. Discuss Grant Drafts

Readings:
WAS: Chapter 11

October 14 - Class 8: Significance and Innovation Due

Research Foundation: Guest speakers
Tamar Sayer, Charlene Martel, Doris Romand
Writing Grant Proposals as a Graduate Student, overview, researching funding opportunities and developing budgets

Readings:
GK: Review Chapter 5 and 7

October 21 - Class 9:
1. Article Discussion
2. Exposure classification
3. Research Strategy

Readings:
WAS: Chapter 3

October 28 - Class 10:
1. Article Discussion
2. Discuss Significance and Innovation Drafts
3. Discuss Project narrative, Abstract and other components

Readings:
WAS: Chapter 4

November 4 - Class 11:
1. Article Discussion
2. Measurement Error
3. Validity and Reliability (Guest Speaker: Michael Bloom, PhD)

Readings:
WAS: Chapter 4 and 5

November 11 - Class 12: Draft Project Narrative due
1. Article Discussion
2. Ethics

Readings:
WAS: Chapter 12
GK: Chapter 6

**November 18 - Class 13:**
1. Article Discussion
2. Discuss Drafts and lectures

**November 25 - Class 14:**
1. Article Discussion
2. Answer final questions for proposal drafts and lectures

**December 2 - Class 15:**
Student Lectures

**December 9 - Class 16: Grant proposals due**
Student Lectures
Instructor information:

JoEllen Welsh, Empire Innovations Professor, Dept of Environmental Health Sciences
304D Cancer Research Center, East Campus
Monday 12-2PM

Course time and location:
Massry Auditorium, CRC, Mon and Wed 2-3:30

Pre-requisites:
Graduate status (registered in MPH, MS or PhD program)
Coursework in undergraduate Cell Biology and Molecular Biology or permission of instructor

Course Description

This course will present an overview of the cancer development process at the cellular and molecular level, including regulatory networks involved in growth control and tissue organization and an introduction to animal, cell and molecular techniques for studying progression, treatment and prevention of cancer.

Course Learning Objectives and Competencies*

Specific Course Objectives:
1. To gain an appreciation of the complexity of the cancer development process at the cellular and molecular level.
2. To provide students with an understanding of regulatory networks involved in growth control and tissue organization. This will primarily be achieved through the study of changes observed when these networks are disturbed in cancer cells.
3. To gain exposure to whole animal, cell culture and molecular techniques for studying progression, treatment and prevention of cancer.
4. To develop fundamental concepts of cancer identification, etiology and epidemiology.
5. To understand the cellular and molecular basis of current strategies for cancer prevention and treatment.
Competencies:

General:
1. Acquire advanced knowledge in the chosen field
2. Read, critically evaluate, and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained.
3. Demonstrate a command of the fundamentals and current state of the discipline sufficient to prepare a written proposal
4. Develop problem solving skills through application of knowledge to a research problem in the chosen track

Track Specific (Toxicology):
1. Acquire broad knowledge of the field of toxicology including the basic principles, target organ toxicity, and the toxicity of a select group of compounds. Know the basic building blocks of toxicology, and be able to build a more detailed knowledge of those particular aspects of toxicology that interest them.
2. Understand the molecular foundations of biological processes, including major current concepts in biochemistry and molecular biology, and have familiarity with the research literature in the molecular biosciences and techniques and applications of modern molecular toxicology.

Textbooks, Lecture Notes and Readings:
This course will predominantly utilize review articles and primary research papers. We will also rely on various web sites for activities and information. Lecture notes and other materials will generally be emailed directly to students. Recommended text: Weinberg, RA. The Biology of Cancer, Second Edition. 2013

Course Format and Grading:
- The course format will include lectures, discussions and activities (readings, web site work, case studies, presentations).
- Two take home style exams will be required, each worth 35% of the final course mark. Details on exams will be provided in class.
- Participation, written assignments and/or presentations throughout the semester will count for 30% of the mark.

POLICY ON ACADEMIC INTEGRITY (Required by UAlbany Senate to be included on all syllabi as of 2013)
“Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity,
and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree.” (University’s Standards of Academic Integrity Policy, Fall 2013)

**COURSE SCHEDULE**

Lecture Schedule - Spring, 2014

**Section I. Introduction to Cancer Biology**

<table>
<thead>
<tr>
<th>Week of</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Jan 22</td>
<td>Organizational session</td>
</tr>
<tr>
<td>Jan 27</td>
<td>Definitions &amp; Pathology</td>
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<tr>
<td>Feb 3</td>
<td>Modeling cancer in vitro and in vivo</td>
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**Section II: DNA Damage, Oncogenes and Tumor Suppressors**

<table>
<thead>
<tr>
<th>Week of</th>
<th>Topic</th>
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<tr>
<td>Feb 10</td>
<td>Mechanisms of Carcinogenesis - Radiation and Chemical</td>
</tr>
<tr>
<td>Feb 17</td>
<td>Cellular responses to DNA damage</td>
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<tr>
<td>Feb 24</td>
<td>Oncogenes including Viral Carcinogenesis</td>
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<tr>
<td>Mar 3</td>
<td>Tumor Suppressor Genes and Familial Cancers</td>
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<td>Mar 10</td>
<td>Hallmarks of Cancer</td>
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</tbody>
</table>

**Take Home Exam 1**

**Week of Mar 17 - Break - No class**

**Section III: Cell and Molecular Biology of Cancer**

<table>
<thead>
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<th>Week of</th>
<th>Topic</th>
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<tr>
<td>Mar 24</td>
<td>Cell Cycle and Senescence</td>
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<tr>
<td>Mar 31</td>
<td>Negative Growth Regulation: Differentiation and Apoptosis</td>
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<tr>
<td>April 7</td>
<td>Cancer Cell Metabolism</td>
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<tr>
<td>April 14</td>
<td>No class</td>
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<tr>
<td>April 21</td>
<td>Angiogenesis, EMT, Invasion and Metastasis</td>
</tr>
<tr>
<td>April 28</td>
<td>Cancer Stem Cells</td>
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<tr>
<td>May 5</td>
<td>Cancer Genomics including epigenomics</td>
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</table>

**Take Home Exam 2**
EHS 632: Atmospheric Environment and Human Welfare

<table>
<thead>
<tr>
<th>Course Director</th>
<th>Haider A. Khwaja, Ph.D., Assistant Professor</th>
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<tbody>
<tr>
<td></td>
<td><a href="mailto:khwaja@wadsworth.org">khwaja@wadsworth.org</a></td>
</tr>
<tr>
<td>School</td>
<td>474-0516; ESP Rm. # D 308</td>
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<tr>
<td>Director</td>
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<tr>
<td>Date/Time, Location</td>
<td>Wednesday, 9:00 – 11:50 AM, Room C6 (1st floor, GEC)</td>
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<tr>
<td>Class Format</td>
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<tr>
<td>a) Lecture:</td>
<td>9:00 – 10:00 AM</td>
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<tr>
<td>b) Break:</td>
<td>10:00 – 10:10 AM</td>
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<tr>
<td>c) Group Discussion:</td>
<td>10:10—11:00 AM</td>
</tr>
<tr>
<td>d) Group/Individual Presentation:</td>
<td>11:00 – 11:50 AM</td>
</tr>
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</table>

1. Course Overview, Competencies, and Objectives

Overview: EHS 632 Atmospheric Environment and Human Welfare provides a broad survey of outdoor air pollution from a human health perspective. We will examine the history, components of the air pollution problem, and the methodological issues associated with the planning and conducting studies of environmental exposures to chemical and biological contaminants. Lectures, readings, and project cover the natural atmosphere, air pollution sources, transport and dispersion, chemical reactions and transformation, and concentration trends. We then review human health impacts, with an emphasis on the interpretation of epidemiology studies documenting associations between population health and air pollution concentrations over space and time. Additional topics include exposure assessment and indoor air quality, global air quality trends, and policy approaches to air pollution control.

The class is composed of three key parts. First is the class. As preparation for each class, you will be provided readings from the textbook and published journal articles, and some study questions. The class will build from these materials using a combination of lecture and class discussion. Everyone is expected to do the readings and to be prepared to answer study questions.

Second is the student-led discussion section. In this class you will be expected to convince your colleagues and ourselves regarding the public health importance of the issue you choose, methods of investigation, and expected results.

Third is the demonstration of your skills as an independent scientist, in the form of a written research proposal. Specific guideline for writing the research proposal will be provided to you. Paper progress will be monitored closely by your instructor, with periodic formal and informal
updates. The investigation proposal will culminate in a written report and oral presentation documenting the study goals, design, methods, expected results, implications, and strengths/weaknesses.

The syllabus and other class forms, the lecture notes, course-related materials, articles and questions will be available for downloading from the course website on the BLS system.

**COMPETENCIES:**

1. Acquire basic and advanced knowledge in selected concentrations.
2. Gain advanced technical experience in the use of sophisticated and state-of-the-art instrumentation in the chosen field
3. Read, critically evaluate, and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained
4. Prepare a written thesis and describe the principles and procedures for techniques involved, quality assurance for data acquisition, and statistical analysis.
5. Present and orally defend knowledge gained in a public seminar
6. Describe issues related to the proper conduct of scientific research, including policies of federal and state agencies, and the university regarding scientific misconduct.

In addition, by mastering following Environmental and Occupational Health Specific competencies, you will have the expertise needed to succeed in the workplace as a public health professional.

1. Have a broad knowledge of the field of environmental health including an understanding of the interaction of principles contained in fundamental environmental chemistry, biology, toxicology, epidemiology and general environmental health. Using this fundamental knowledge the students will then develop a refined knowledge related to their particular field of study within environmental or occupational health.
2. Have the skills, obtained during their course of instruction, to apply technical knowledge to both field and laboratory investigations. This will include recognizing the elements needed for a successful investigations, acquisition and integration of the information to meet study objectives and investigation resolution.
3. Assess risks from either environmental or occupational exposures and identify measures to mitigate the risks.
4. Manage data acquired during field and laboratory investigations. This will include the basic knowledge of statistics including hypothesis development, hypothesis testing and fundamental concepts involving data manipulation using parametric and non-parametric analyses.

This course is designed to help you cultivate these competencies through a set of learning objectives. Specifically, by the end of this course you will:
• Define source, mode of transmission, and other aspects of indoor and outdoor air pollution; and

• Identify mode of human exposure to indoor and outdoor air pollution; and

• Communicate methods to measure human exposure; and

• Discuss policies that have been developed to manage health risks associated with exposures to air pollution; and

• Identify chemical, physical, and microbial factors that modify air pollution risk; and

• Develop an understanding of air pollution data management, analysis, and quality assurance and control; and

• Interpret results of studies in environmental exposure to chemical and biological contaminants; and

• Evaluate the quality of measured environmental data;
  
  a. Assess factors that can modify environmental exposures; and

  b. Communicate scientific findings of environmental exposures.

2. Reading Material


Reading Materials: Lecture notes, assignments, and other course materials will be posted on the Blackboard Learning System course web-site. Students registered for the class can access the course material through the MyUalbany link to BLS.

3. Lecture and Discussion Preparation

Each classroom session is divided into the lecture (1 hr 20 min) and discussion of the journal articles (1 hr 20 min). The course is designed in such a way that the lecture material covered in any particular week is usually followed by a discussion on that material during second half of the same session. Aim of the discussion is to own the concept, and methods of the given lecture material in the same session. Individual student will lead the group discussion during the second half of each session. During most sessions, Dr. Choi, Dr. Khwaja, and other guest faculty members will facilitate the discussion. At least two week before each lecture, 2 discussion articles will be made available on BLS. At least one week before each week, the student leader for that week is expected to develop five discussion questions, and submit them to Dr. Choi and Dr. Khwaja for approval.
Please do the assigned readings and questions before class. Type the answers to the Discussion questions before you come to class. This will allow you to go over the ideas involved, and be ready to discuss these ideas in the Discussion. Your grade will be based on your academic leadership (i.e. the quality of the questions, discussion, ability to listen, integrate and analyze).

The best way to learn (and evaluate if you are learning) epidemiology is by speaking it. There will be opportunity in Discussions to express your ideas. Additionally, we encourage you to join a study group so that you have additional time to discuss ideas. In order to best assess your level of effort regarding the Discussion questions, the Discussion contents WILL BE INCORPORATED INTO THE MID-TERM and/or the FINAL.

4. GRADING

**Weekly Discussion (25%)**
**Project Report (20%) and Presentation (5 %)**
**Mid-term (In class, closed-book) (25 %)**
**Final (In class, closed-book) (25 %)**

Total score for the class need to meet the following criteria:

- 95-100 A
- 90-94 A-
- 87-89 B+
- 84-86 B
- 80-83 B-
- 77-79 C+
- 74-76 C
- 70-73 C-
- 69 or lower D+ or lower

Instructor reserves the right to move the grading cut-points, however the cut points will not be changed to a lower letter grade (e.g. a 90 will not result in a grade below A-).

**Academic Integrity:** It is understood that when you sign and submit your project, midterm and the final exam, you agree to the university honor pledge: "I have neither given nor received unauthorized aid on this test or assignment." In addition, you are not allowed to discuss or provide the exam to other students after taking the exam.

All students need to be aware of the University at Albany's standards of conduct as described in the booklet Community Rights and Responsibilities (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic integrity will be strictly enforced. Any violation of UAlbany’s Standards of Academic Integrity,
including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the Community Rights & Responsibilities (see course information for a copy) will result in a failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany judicial system.

**Plagiarism:** Presenting as one's own work, the work of another person (for example, the words, ideas, information, data, evidence, organizing principles, or style of presentation of someone else). Plagiarism includes paraphrasing or summarizing without acknowledgment, submission of another student's work as one's own, the purchase of prepared research or completed papers or projects, and the unacknowledged use of research sources gathered by someone else. Failure to indicate accurately the extent and precise nature of one's reliance on other sources is also a form of plagiarism. The student is responsible for understanding the legitimate use of sources, the appropriate ways of acknowledging academic, scholarly, or creative indebtedness, and the consequences for violating University regulations.

Examples of plagiarism include: failure to acknowledge the source(s) of even a few phrases, sentences, or paragraphs; failure to acknowledge a quotation or paraphrase of paragraph-length sections of a paper; failure to acknowledge the source(s) of a major idea or the source(s) for an ordering principle central to the paper's or project's structure; failure to acknowledge the source (quoted, paraphrased, or summarized) of major sections or passages in the paper or project; the unacknowledged use of several major ideas or extensive reliance on another person's data, evidence, or critical method; submitting as one's own work, work borrowed, stolen, or purchased from someone else. For more information concerning plagiarism, see the library’s tutorial on the subject on the library web site. Graduate students will find additional information concerning Academic Integrity, Conduct, and Research Regulations on the Graduate Studies web site.”

(Source: [http://www.albany.edu/graduatebulletin/requirements_degree.htm#examples_dishonesty](http://www.albany.edu/graduatebulletin/requirements_degree.htm#examples_dishonesty), accessed May 16, 2013)

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EHS 632: Atmospheric Environment and Human Welfare

Course Director: Hyunok Choi, Ph.D., MPH, Assistant Professor
School of Public Health, Rm. #153
One University Place
Rensselaer, NY 12144
(518) 403-0401
hchoi@albany.edu

Haider A. Khwaja, Ph.D., Assistant Professor
khwaja@wadsworth.org
474-0516; ESP Rm. #D 308

Office Hour: by appointment

Date/Time, Location
Wednesdays, 9:00 – 11:50 AM, Room C6 (1st floor, GEC)

Class Format
a) Lecture: 9:00 – 10:00 AM
b) Break: 10:00 – 10:10 AM
c) Group Discussion: 10:10—11:00 AM
d) Group/Individual Presentation: 11:00 – 11:50 AM

1. Course Overview, Competencies, and Objectives

Overview: EHS 632 Atmospheric Environment and Human Welfare provides a broad survey of outdoor air pollution from a human health perspective. We will examine the history, components of the air pollution problem, and the methodological issues associated with the planning and conducting studies of environmental exposures to chemical and biological contaminants. Lectures, readings, and project cover the natural atmosphere, air pollution sources, transport and dispersion, chemical reactions and transformation, and concentration trends. We then review human health impacts, with an emphasis on the interpretation of epidemiology studies documenting associations between population health and air pollution concentrations over space and time. Additional topics include exposure assessment and indoor air quality, global air quality trends, and policy approaches to air pollution control.

The class is composed of three key parts. First is the class. As preparation for each class, you will be provided readings from the textbook and published journal articles, and some study questions. The class will build from these materials using a combination of lecture and class discussion. Everyone is expected to do the readings and to be prepared to answer study questions.

Second is the student-led discussion section. In this class you will be expected to convince your colleagues and ourselves regarding the public health importance of the issue you choose, methods of investigation, and expected results.

Third is the demonstration of your skills as an independent scientist, in the form of a written research proposal. Specific guideline for writing the research proposal will be provided to you. Paper progress will be monitored closely by your instructor, with periodic formal and informal
updates. The investigation proposal will culminate in a written report and oral presentation documenting the study goals, design, methods, expected results, implications, and strengths/weaknesses.

The syllabus and other class forms, the lecture notes, course-related materials, articles and questions will be available for downloading from the course website on the BLS system.

**COMPETENCIES:** By mastering following competencies, you will have the expertise needed to succeed in the workplace as a public health professional.

A. ASSESSMENT

- **Information Gathering:** The capacity to identify relevant journal articles, assemble relevant information when needed.

- **Data Analysis and Interpretation:** The capacity to analyze data presented in the journal articles, recognize meaningful test results, interpret results, and present the results in an appropriate way to different types of audiences.

- **Evaluation:** The capacity to evaluate the effectiveness or performance of procedures, interventions, and programs.

B. MANAGEMENT

- **Problem Solving:** The capacity to develop insight into and appropriate solutions to environmental health problems.

- **Reporting, Documentation, and Record-Keeping:** The capacity to produce reports to document actions, keep records, and inform appropriate parties.

- **Collaboration:** The capacity to form partnerships and alliances with other individuals and organizations in order to enhance performance on the job.

C. COMMUNICATION

- **Educate:** The capacity to effectively educate the public on environmental health issues and the public health rationale for recommendations.

- **Communicate:** The capacity to effectively communicate risk and exchange information with colleagues, other practitioners, clients, policy-makers, interest groups, media, and the public.

This course is designed to help you cultivate these competencies through a set of learning objectives. Specifically, by the end of this course you will:

- Define source, mode of transmission, and other aspects of indoor and outdoor air pollution; and
- Identify mode of human exposure to indoor and outdoor air pollution; and
- Communicate methods to measure human exposure; and
- Discuss policies that have been developed to manage health risks associated with exposures to air pollution; and
- Identify chemical, physical, and microbial factors that modify air pollution risk; and
- Develop an understanding of air pollution data management, analysis, and quality assurance and control; and
- Interpret results of studies in environmental exposure to chemical and biological contaminants; and
- Evaluate the quality of measured environmental data;
  a. Assess factors that can modify environmental exposures; and
  b. Communicate scientific findings of environmental exposures.

2. Reading Material


Reading Materials: Lecture notes, assignments, and other course materials will be posted on the Blackboard Learning System course web-site. Students registered for the class can access the course material through the MyUalbany link to BLS.

3. Lecture and Discussion Preparation

Each classroom session is divided into the lecture (1 hr 20 min) and discussion of the journal articles (1 hr 20 min). The course is designed in such a way that the lecture material covered in any particular week is usually followed by a discussion on that material during second half of the same session. Aim of the discussion is to own the concept, and methods of the given lecture material in the same session. Individual student will lead the group discussion during the second half of each session. During most sessions, Dr. Choi, Dr. Khwaja, and other guest faculty members will facilitate the discussion. At least two week before each lecture, 2 discussion articles will be made available on BLS. At least one week before each week, the student leader for that week is expected to develop five discussion questions, and submit them to Dr. Choi and Dr. Khwaja for approval.

Please do the assigned readings and questions before class. Type the answers to the Discussion questions before you come to class. This will allow you to go over the ideas involved, and be ready to discuss these ideas in the Discussion. Your grade will be based on
your academic leadership (i.e. the quality of the questions, discussion, ability to listen, integrate and analyze).

The best way to learn (and evaluate if you are learning) epidemiology is by speaking it. There will be opportunity in Discussions to express your ideas. Additionally, we encourage you to join a study group so that you have additional time to discuss ideas. In order to best assess your level of effort regarding the Discussion questions, the Discussion contents WILL BE INCORPORATED INTO THE MID-TERM and/or the FINAL.

4. GRADING

Weekly Discussion (25%)
Project Report (20%) and Presentation (5 %)
Mid-term (In class, closed-book) (25 %)
Final (In class, closed-book) (25 %)

Total score for the class need to meet the following criteria:

95-100   A
90-94    A-
87-89    B+
84-86    B
80-83    B-
77-79    C+
74-76    C
70-73    C-
69 or lower D+ or lower

Instructor reserves the right to move the grading cut-points, however the cut points will not be changed to a lower letter grade (e.g. a 90 will not result in a grade below A-).

Academic Integrity: It is understood that when you sign and submit your project, midterm and the final exam, you agree to the university honor pledge: "I have neither given nor received unauthorized aid on this test or assignment." In addition, you are not allowed to discuss or provide the exam to other students after taking the exam.

All students need to be aware of the University at Albany's standards of conduct as described in the booklet Community Rights and Responsibilities (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic integrity will be strictly enforced. Any violation of UAIn's Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the Community Rights & Responsibilities (see course information for a copy) will result in a
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Instructor information:
Nancy K. Kim, Ph.D.     Edward F. Fitzgerald, Ph.D.
Adjunct Associate Professor    Professor
Department of Environmental Health Sciences    Departments of Environmental Health Sciences and Epidemiology and Biostatistics
Room 1276 Corning Tower    School of Public Health, Room 100
Empire State Plaza    One University Place, East Campus 105
Albany, NY 12237    Rensselaer, NY 12144
Phone: 518-402-7511    Phone: 518-402-1062
Office hours: Schedule appointment    Office hours:

Course Instructors:
Nancy Kim (nkk01@health.state.ny.us), Edward Fitzgerald (efitzgerald@uamail.albany.edu), Thomas Wainman (txw05@health.state.ny.us), Lloyd Wilson (lrw03@health.state.ny.us), Faith Schottenfeld (fls02@health.state.ny.us), Karim Rimawi (kxrimawi@gmail.com), Gregg Recer (gmr05@health.state.ny.us)

Class Room C6, East Campus Building
Tuesday and Thursday, 9:00 a.m. – 10:20 a.m.

Pre-requisites
EPI 501 Principles and Methods of Epidemiology (3 credits)
EHS 530 Principles of Toxicology (3 credits)

COURSE INFORMATION

COURSE DESCRIPTION

This course provides an introduction to the science of assessing human health risks from chemical, radiological and microbial-exposures, generally in the context of environmental contamination. It includes: (a) hazard identification; (b) dose-response assessment; (c) exposure assessment; (d) risk characterization; and (e) risk communication. This course will impart analytical skills that students can use in developing, interpreting, and understanding risk assessments for individual chemicals or specific contamination incidents involving human exposure. It is primarily a skills course, rather than a course aimed at presenting a body of substantive knowledge about individual chemicals.
As a result of this course, students will be able to

- Read, understand and critique a risk assessment paper,
- Explain how risks from environmental exposures are assessed,
- Prepare a simple risk assessment.

They will also be able to demonstrate the following EHS competencies:

1. Acquire basic knowledge in the area of environmental health, including two of the three sciences relevant to environmental health: chemistry, toxicology, and radiation sciences.
2. Acquire skills in collecting and analyzing environmental data, dose-response assessment and risk assessment.
3. Become part of a public health team, using scientific knowledge and communication
4. Read, critically evaluate, and present scientific literature, including justifying the choice of applied methods to problems and the interpretation of results obtained
5. Assess risks from either environmental or occupational exposures and identify measures to mitigate the risks.

Lectures, readings, assignments, journal articles, grades, etc., will be posted on Blackboard.

None.

Each assignment/test will be given a numerical grade and a letter grade. The course grade will be based on the numerical grades.

Tests: 15% each
Term Project: 20% (Presentation 10%; Paper 10%)
Blackboard Exercises: 10% (5% each)
Homework: 20%
Cumulative Final: 20%
Term project consists of a paper and presentation:

Term Paper
The term paper must:
- Describe the pathways of exposure for your chemical/organism/site, include quantitative exposure estimates.
- For your chemical/organism/site, describe the health effects, identify, RfDs, RfCs, CPFs, developed by EPA (IRIS), ATSDR (tox profiles or CAL get web site) and describe their derivation. If, for example, EPA and ATSDR have different RfDs, decide which you think is better and state why.
- Characterize the health risks from the major exposure pathway. Identify any major public health issues.
- Write a fact sheet providing advice for the general public.
- Write a briefing memo (no more than 1 page) for the Commissioner of Health that includes a recommendation about how the Department of Health should proceed.

Term Presentation
The term presentation should focus on unusual and/or interesting science related to your paper and need not cover all aspects of the term paper.

POLICY ON ACADEMIC INTEGRITY (Required by UAlbany Senate to be included on all syllabi as of 2013)
The policies and procedures regarding Standards of Academic Integrity were revised by action of the University Senate as of Fall 2013. See full text in Graduate Bulletin http://www.albany.edu/graduatebulletin/requirements_degree.htm#standards_integrity, or Undergraduate Bulletin http://www.albany.edu/undergraduate_bulletin/regulations.html.

“Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree.” (University’s Standards of Academic Integrity Policy, Fall 2013)

OTHER CLASS POLICIES

Students are expected to attend all classes and be on time. Consistent tardiness will be penalized 5%. Homework assignments will be penalized 5%.

COURSE SCHEDULE
## COURSE READING LIST

See Blackboard for reading assignments.
Responsible Conduct of Scientific Research
EHS 675/BMS 670
Course Syllabus
Spring 2014
Wednesdays, 3:30-4:30 p.m.
Center for Medical Science 1st Floor Conference Room

INSTRUCTORS

Robert Jansing, Ph.D.
Research Scientist Wadsworth Center
Assistant Professor
Department of Environmental Health Sciences
ESP D622
(518) 473-0321
jansing@wadsworth.org

Kathy Chou, Ph.D.
Adjunct Assistant Professor
Department of Biomedical Sciences
ESP C345
(518) 474-8969
yxc10@health.state.ny.us

Todd Gray, Ph.D.
Research Scientist, NYSDOH Wadsworth Center
Assistant Professor, U of Albany School of Pub Health
5225 Center for Medical Science
130 New Scotland Avenue Albany, NY 12208
(518) 473-6078
gray@wadsworth.org

OFFICE HOURS:
By Appointment.

COURSE DESCRIPTION:
The course is designed to meeting current federal regulations, which require that all institutions receiving NIH training grants provide training in the responsible conduct of research. The purpose of this course is to engage students in reading, considering, and discussing the responsible conduct of scientific research.

COURSE COMPETENCIES:
This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including: present and orally defend knowledge gained in a public seminar; and describe issues related to the proper conduct of scientific research, including policies of federal and state agencies, and the university regarding scientific misconduct.

COURSE PREREQUISITES:
None

COURSE FORMAT:
Course topics will be covered by a combination of one or more of the following elements: lectures, assigned readings in the course text ("Introduction to the Responsible Conduct of Research"), additional recommended readings provided by the instructors, assigned case studies, and discussion in class. The course will be structured around weekly 1-hour seminar sessions. The first half of the session will be devoted to a discussion of the assigned readings and the ethical issues which they raise. The second half of the session will be devoted to discussing and applying those issues to the assigned case for the session.

**COURSE REQUIREMENTS:**

Attendance and participation in classroom discussion is mandatory and will provide the basis for credit. Grades are assigned on a “Satisfactory/Unsatisfactory” basis.

To receive credit for the course, each student will be expected to:

1) Lead at least one classroom discussion; and

2) Actively participate in all classroom discussions.

Although students are expected to attend all classes, we understand that emergencies can sometimes arise. Students who miss a class will be asked to write a short paper outlining a controversy or discussing an issue relevant to the responsible conduct of scientific research. The topic of the paper will be assigned by one of the course instructors. The length of the paper will increase exponentially for each class missed, for the first missed class, students will write a 2-page paper; for the second class, a 4-page paper; for the third class, an 8-page paper, etc. Students who fail to read the assigned materials and who attend class unprepared to fully participate also will be required to write a paper.

**ONLINE TEXT:** ORI Introduction to Responsible Conduct of Research
Nicholas H. Steneck, Revised 2007

http://www_ori_hhs_gov/documents/rcrintro.pdf

Additional readings will be assigned by the instructors. All students are expected to review the assigned reading and cases prior to class. Students also are encouraged to independently research and review other cases and papers related to the weekly discussion topics.

**SOME RECOMMENDED ON-LINE RESOURCES:**

American Journal of Bioethics/
Bioethics Net: http://bioethics.net/


Journal of Medical Ethics Online: http://jme.bmjjournals.com/

Natl. Bioethics Advisory Committee: http://georgetown.edu/research/nrcbl/nbac/

Office of Research Integrity: http://ori.dhhs.gov/
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Additional Readings

1/22 Introduction to Course; Ethics and Decision-making
- What is ethics?
- Ethics and Morality
- Value of Ethics
- Ethical Relativism
- SUNY Albany Academic Honesty Guidelines

1/29 Research Misconduct
- Fixing Fraud
- BioTech Fraud
- NYSDOH APPM 633.4
- Misconduct Case 1

2/5 Data Management Practices
- David Baltimore/Imanishi-Kari Case
- Data Management University of Pittsburgh
- To Replicate or Not To Replicate?

2/12 Mentoring and Trainee Responsibilities
- Yaner_Graduate Student Mentoring
- Bob Bailey Case Study
- Search Harran/Sanjii/UCLA case study

2/19 Collaborative Research
- Wadsworth Center Materials Transfer Agreement Form
- Wadsworth Center Sample Collaboration Agreement Form
- Multiple PI Grant Applications
- NIH_UBMTA_Master

2/26 Authorship / Publication and Plagiarism
- A Plague of Plagiarism
- Ghost Writers
- Charlie West Case Study
- Diane Archer Case Study
- Search Internet for Stephen Ambrose and Doris Kearns Goodwin cases

3/5 Peer Review
- Chemical and Engineering News Article on Peer Review 2/11/08
- Stem Cell Paper Retraction
- Global Trend More Science, More Fraud_2005
- Stem-cell cloner acknowledges errors in groundbreaking paper
- Students asked to review manuscript
- Marcus and Oransky Nature 2011
- Refutation Rumble

3/12 Conflicts of Interest
- COI Reading 1
- COI Reading 2
- Jesse Gelsinger Case
- Vioxx Studies
3/26 The Welfare of Laboratory Animals
- HUSU Statement on Animals in Biomedical Research
- The Lifeboat Test-McCrone
- Jenny Ito Case Study
- Lab-Bred Chimps Nature 2011

4/2 The Protection of Human Subjects I
- McGuire Dunn 1
- Belmont Report
- Transplant Denial- Kaplan
- Stem Cell Texas-1
- Stem Cell Texas-2
- ASRM_Human somatic cell nuclear transfer_2012
- Impracticality of egg donor recruitment in the absence of compensation_2011
- Pluripotent Stem Cells from Cloned Human Embryos_2013

4/9 The Protection of Human Subjects II
- Informed Consent Document
- Surrogate mother had the right to choose_2013
- voice-of-patients-stem cells_2013
- Report_FDA
- Paul Gelsinger
- Ethical Neuroscientist
- NASA Bioethicist

4/16 Cross-Cultural Research
- Trovan and Meningitis case study
- Ellen- Maternal viral transmission study case study
- Clinical Trails Guatemala
- Cross cultural research informed consent

4/23 Genetic Testing and Research
- HeLa Comment
- HeLa Nature
- Opinion recap No patent on natural gene work SCOTUS blog
- Can a human gene be patented
- Arthur Caplan- “Peter Pan” Treatment 2007
- New York State Civil Rights Law 79, Appendix L
- Property Rights_Genetic Material
- Human oocyte letter -Nature
- Myriad Genetics-Science Insider
- Case Study-Stephen
- DNA Donor Rights

4/30 Guest Lecture

Academic Integrity
All students need to be aware of the University at Albany's standards of conduct as described in the booklet Community Rights and Responsibilities (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the
contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. Any violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. will result in a failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany judicial system.
DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES

EHS 690: Laboratory Rotations

2014 - 2015
1. General information

The selection of a rotation project is one of the first and most important decisions that a new graduate student will make. The decision may determine the direction your dissertation research project may take and ultimately send you on your career path.

Selection and completion of rotation projects is a collaborative effort between the student, the faculty project mentor and the rotation coordinator. The rotation coordinator assists the student in finding the project that best matches the student’s interests and objectives. The selection of a rotation project by the student is made in agreement with a faculty mentor for the project. The mentor guides the student through the project and the preparation of a report. The coordinator checks on the student’s progress through the rotation, reviews the report, and assists the mentor in establishing a final grade.

This booklet contains information to help you understand the requirements and provides a time line for completing the two Lab Rotations. It contains a listing of rotation projects and mentors, and sample student-faculty mentor agreement form, mentor evaluation and student evaluation forms. These forms can be obtained from http://www.albany.edu/sph/18694.php. The evaluation forms should be completed at the end of each rotation. You should read this information as soon as possible. Then you should meet with potential faculty mentors and decide upon your first rotation project. Complete the student-faculty mentor agreement form and submit copies to the rotation coordinator and the department office so that you can get started on your lab rotation project as soon as possible and no later than September 5.

The rotation coordinator is Dr. Xianliang Zhou. He is located in room D-498B and can be reached by phone: (518) 474-6693 or e-mail: zhoux@wadsworth.org. The contact and/or location information for each faculty mentor is listed with the project descriptions.
2. Course description for EHS 690: LABORATORY ROTATIONS

The aims of the laboratory rotations are:

1. To allow the student to interact with scientists of varied disciplines.
2. To introduce the student to analytical, field and laboratory techniques and principles.
3. To give both the students and the faculty an opportunity to interact intellectually.
4. To aid the student in selecting a mentor for graduate research.

All students must participate in the rotations. Students may not repeat a rotation with the same mentor. Exceptions to this plan are subject to approval of the Department Chairman. The student is expected to dedicate at least 12 hours per week to each rotation.

Competencies: This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:

1. Acquire basic and advanced knowledge in selected concentrations.
2. Gain advanced technical experience in the use of sophisticated and state-of-the-art instrumentation in the chosen field.
3. Read, critically evaluate, and present scientific literature, including justifying the choice of methods applied to problems and the interpretation of results obtained.
4. Prepare a report and describe the principles and procedures for techniques involved, quality assurance for data acquisition, and statistical analysis.

Rotation Schedule: Ph.D. and M.S. students will take two rotations for a total of three credits. Each rotation in the semester will last 7 weeks. The grading system is S/U. An unsatisfactory grade in any rotation will result in a U for that semester. Please note that a satisfactory grade in BOTH rotations must be attained to fulfill the rotation requirement. A Rotations Coordinator (hereafter “Coordinator”) will help match students with appropriate Faculty Research Mentors (hereafter “Mentors”).

The rotation schedule is designed to obtain the maximum analytical, field, and laboratory experience within the framework of courses and additional graduate responsibilities.

Student Obligations: A student may choose to work with any faculty member within the Department of Environmental Health Sciences. The student may be working in the field, laboratory, or office environment, or some combination thereof. The student may not spend the entire rotation time exclusively in an office setting. The equivalent of one rotation’s time must be spent in a field or laboratory setting, or a combination of these settings. An office-based rotation must be spent learning skills directly applicable to carrying out scientific research. Some examples of acceptable office-based rotation activities are: Statistical analysis of databases, computer modeling of data, and mapping using a geographic information system (GIS). Special permission may be given to a student who wishes to complete a lab rotation with a faculty member in one of the school's other departments.

At the end of each rotation, the students are required to write a formal report describing
their project. This report should be graded and signed by the Mentor before submission of copies to both the Coordinator and the departmental office. Note that the final version of the report should be submitted to the Department Office no more than one week after the end of a rotation. The student is responsible for submitting this report, and failure to do so will result in an “incomplete” grade. The Mentor also should complete an evaluation form and review it with the student before submitting copies to both the Coordinator and the departmental office for assignment of a final grade.

All students need to be aware of the University at Albany’s standards of conduct as described in the booklet Community Rights and Responsibilities (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic integrity will be strictly enforced. Any violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the Community Rights & Responsibilities (see course information for a copy) will result in a failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany judicial system.

Research Mentor Responsibilities

- Notify Rotations Coordinator about possible research opportunities;
- Supply descriptive material about the research to the student and/or Coordinator;
- Meet with students to discuss opportunities;
- Approve or disapprove cross-over projects between Centers in the Health Department (e.g. Wadsworth and Environmental Health) and recommend alternative;
- Mentor research by providing direction, space and resources;
- Work with Coordinator to determine and submit grades.

Rotations Coordinator Responsibilities

- Assist student in finding a Research Mentor;
- Assist student placement in cross-over rotations projects;
- Verify that the project meets with the Track Coordinator and Research Mentor’s approval;
- Track student progress;
- Collect all progress reports;
- Collect and submit project grades in cooperation with Research Mentors;
- The Rotation Coordinator is also responsible for obtaining the “EHS Rotation Evaluation Form”. This form may be obtained from the Department Office. It should be clear that the Coordinator will work with both mentors in a given semester to determine and submit a final grade. In order to meet University at Albany grading
deadlines, the evaluation must be submitted to the Department Office no later than one week after the rotation has been completed or by the last day of the week of Final Examinations.

3. Time line for completion of rotations

Fall (2014)

First rotation begins: Friday, September 5  
First rotation ends: Friday, October 24  
Project report due to mentor: Tuesday, October 28  
Grade due: Friday, October 31  
Second rotation begins: Monday, November 3  
Second rotation ends: Monday, December 15  
Project report due to mentor: Wednesday, December 17  
Grade due: Friday, December 19
Spring (2015)

First rotation begins:       Wednesday, January 14
First rotation ends:        Wednesday, March 4
Project report due to mentor:      Friday, March 6
Grade due:                  Wednesday, March 11
Second rotation begins:    Thursday, March 12
Second rotation ends:         Tuesday, April 28
Project report due to mentor:      Thursday, April 30
Grade due:                  Monday, May 4

4. General guidelines for project report

A rotation project report should follow the format of those that are typically prepared by the mentor.

For lab based research: A report is prepared as a manuscript would be for submission to a scientific journal. This would include: an Abstract that briefly summarizes the report; an Introduction, providing background and stating the purpose or specific aims of the project; a Methods and Materials sections with enough detail that would permit reproduction by someone in an external lab; a Results section describing the results of the experiments and providing data in the form of figures, tables or graphs; a Discussion section in which the significance of the results are explained with some attempt to relate them to public health issues; and finally a list of References cited in the text that document your sources of information. See the University guidelines for information regarding plagiarism and proper citation of references.

For office-based, service, or field testing projects: A summary report is similar to the type that might be sent to a lab chief, a regulatory agency, a city, county or state health official or to a contracting agency. This report should have enough information to be understood by someone outside the area of expertise or a layperson, if appropriate.

The length of the report is flexible. It should be of adequate length to fulfill the above criteria. Brevity is preferred over verbosity. The mentor should realize that this is a first attempt for most students. The student will need a great deal of guidance with this process. The report should be something that is developed throughout the rotation with frequent interaction between the student and mentor. However, the report should not be the primary focus of the rotation. The practical experience of engagement in a laboratory, office or field-based research project should be the primary focus. The final report should grow naturally out of the work performed during the rotation. The report should not be an afterthought ignored until the last week of the rotation.

The mentor should assign a letter grade to the report, sign it and submit copies to both the rotation coordinator and the department office.

The mentor and the student also should complete an evaluation form and review it
together before submitting copies to both the Coordinator and the departmental office for assignment of a final grade.

5. Mentor and Project Descriptions for EHS 690: Laboratory Rotations

The following information is provided for each mentor who submitted a project this year.

1. The mentor’s name, title, and location.
2. A description of a research, service, or field testing project a new graduate student would be able to perform during a seven-week rotation.
3. An indication of whether the project is field, laboratory or office-based.

The descriptions are arranged by Track discipline and then alphabetically by mentor.

Environmental Chemistry Track

Mentor: Katherine T. Alben, PhD, Assistant Professor, D300, ESP. E-mail: alben@wadsworth.org

Projects:

The photosynthetic pigments - chlorophylls and carotenoids - are among the most beautiful of small molecules found in nature. Biologically, they are known to play important functions in vision, in reproduction, in the neuroendocrine system, and in the immune system. Chemically, they are known for their ability to bind with fatty acids and proteins, to partition to membranes, to absorb light, and to react with oxidants.

Our laboratory is primarily interested in analysis of carotenoids, retinoids, tocopherols and lipids in diverse samples collected from the Great Lakes:

a) algae, macrophytes, sediment cores: to understand processes for cycling of biomass and to screen for changes in algal productivity as function of time, resulting from changes in environmental management and ecology (discharges of nutrients; growth of non-native filter-feeding mussels, changes in climate)

b) biological organisms (eg bivalves; gastropods; crustaceans; fish): to gain insight into the diet of aquatic organisms, pathways for utilization of algal carotenoids, and food-web relationships among organisms

Pigment composition is determined by preparation of solvent extracts, which are analyzed by HPLC with photodiode array detection (PDA), and ultimately, APCI-ion trap mass spectrometry. Funding has been provided by US EPA Great Lakes National Program Office and New York Sea Grant: results on these projects are given in PhD dissertations by Maxime Bridoux and Monika Sobiechowska, completed in August 2008.

Lab rotations would typically involve experience comparing different techniques in a method of analysis (sample preparation; instrumental conditions), and comparing the
composition of different, but related, sample types (biological specimens or sediments). As work progresses, experimental results should be fully interpreted and written up as technical reports which combine to make the final report. Examples of short-term projects of immediate interest include:

a) LC-PDA/APCI-ion trap-MS determination of  
i) spectra and calibration curves for several standard pigments in diatoms;  
ii) molecular weights and structures of several relatively abundant unknowns in select extracts of mussels;  
iii) ability to decrease background but maintain high resolution separation of fatty acid esters of carotenoids in crustaceans, by substituting acetonitrile for acetone in mobile phase preparation;  
iv) formation of acetonitrile adducts by polyunsaturated fatty acids in esters of carotenoids and retinol

b) UPLC-PDA/FI versus conventional HPLC-PDA/FI analysis: optimization of instrumental conditions for determination of carotenoids and chlorophylls with maximum resolution in minimum time, and comparable sensitivity

Specific projects depend on the balance of students’ interests and on related activities in the lab at the time of the rotation.

Mentor: Liang T. Chu, Ph.D., Associate Professor, Office: D568A, Lab: D366B, ESP. E-mail: lchu@wadsworth.org

Project: Uptake and heterogeneous reactions on ice surfaces  
The project is aimed to understand how snow/ice and aerosols are affected by organic acids in the atmosphere. Organic acids have impact on aerosol growth rate and subsequently affect ozone distribution and climate.

The project will involve the study of hydrogen peroxide and formic acid uptake on ice surfaces and heterogeneous reaction between NH₃ and formic acid on ice surfaces. The ice surface mimics clouds and snow/ice in the atmosphere. The study will be conducted using both the wall coated flow-reactor and the specular reflection-absorption FTIR with temperature-programmed desorption apparatus in the laboratory. Students will learn both mass spectrometry and FTIR spectroscopy. Laboratory based.

Mentor: Haider A. Khwaja, Ph.D., Assistant Professor, D308, ESP, 474-0516. E-mail: khwaja@wadsworth.org

My research interests lie in the field of environmental health sciences. Active research programs include:

1) Effects of fine particulate matter on daily morbidity due to cardiovascular and pulmonary diseases in urban areas;
2) Chemical characteristics of fine particles responsible for the observed health effects;
3) Exposure and health impacts related to outdoor and indoor air pollution including studies of volatile organic compounds (VOCs), polycyclic aromatic
hydrocarbons (PAHs), diesel vehicle emission, air toxins, and indoor allergens; and

4) Water and human health issues such as drinking water quality and human health risks associated with water contaminants.

Students will be involved in current literature search, developing study design, conducting data collection, analysis and interpretation of the data.

Mentor: Patrick J. Parsons Ph.D., Professor and Chair/Lab Chief, Inorganic and Nuclear Chemistry, D144, ESP, 474-7161. E-mail: pparsons@wadsworth.org

Dr. Parsons' laboratory specializes in measuring trace elements in human tissues and body fluids using techniques based on inorganic mass spectrometry. The lab is developing new analytical methods for use in human biomonitoring studies (with CDC grant funding), wherein the primary goal is to assess internal exposure (or dose) typically by analyzing blood or urine, or another tissue for trace element content. These studies are important for understanding the biochemical role of essential elements, such as Cu, Se and Zn, and monitoring human exposure to non-essential toxic elements such as Pb, Cd, Hg and As.

The laboratory is also interested in assessing the physiologic distribution of lead in bone. Recent work by the team, has focused on producing well-characterized bone reference materials certified for lead content that can be used to validate techniques based on graphite furnace atomic absorption spectrometry (GFAAS), inductively coupled plasma-mass spectrometry (ICP-MS), as well as K-shell X-ray fluorescence (XRF) instrumentation that is used for non-invasive, in vivo bone lead measurements. Although the total elemental content is useful, speciation methods can provide a much more detailed picture of how some trace elements behave. For example, the lab has been working with the US National Institute for Standards and Technology (NIST) and the CDC on a speciation method for Hg in blood that can distinguish and quantitate methylmercury, ethylmercury and inorganic Hg. The method is based on coupling GC to ICP-MS with stable isotope dilution analysis. In a similar manner, the lab can analyze human urine for up to five arsenic species by coupling LC to ICP-MS. The lab has five quadrupole ICP-MS instruments and six GFAAS dedicated to the analysis of clinical samples, and a Thermo Element 2 Sector Field ICP-MS that is currently being used to measure uranium isotope ratios in urine for a local biomonitoring study of residents and retired workers exposed to Depleted Uranium (DU).

While the research team's primary focus has been on analyzing body fluids using ICP-MS and GFAAS, the laboratory also has access to new prototype instrumentation based on monochromatic XRF as part of an on-going collaboration with X-Ray Optical Systems (XOS, East Greenbush). One project involves assessing environmental exposure to Pb, As, and Hg among ethnic Chinese living in upstate NY, and is currently supported by NIEHS. Dr. Parsons is also interested in studying the physiologic distribution of trace elements in bone, teeth and brain samples using Laser Ablation coupled to ICP-MS, with recent work focusing on developing calibration materials for
quantification. Other research projects involve collaborations with investigators at the Johns Hopkins Bloomberg School of Public Health, Mt Sinai School of Medicine, NICHD, SUNY Oswego, SUNY Albany, and the University of Cincinnati. There is a long standing collaboration and student exchange program with the trace elements group at the Universidade de São Paulo – Ribeirão Preto, Brasil. In addition to externally funded research studies, the laboratory also operates the New York State proficiency testing program for blood lead and trace elements. Well-characterized blood, serum and urine reference materials are developed and certified for trace element content, and the team has also worked with NIST to produce and certify SRM 955c Toxic Metals in Caprine Blood.

We typically have several lab-based projects suitable for rotation students.

Project 1: Transferability of methods for blood lead and serum aluminum from one GFAAS instrument to another. Working with Dr. Diana Guimaraes Guedes, a postdoctoral fellow in our lab and other staff scientists in the Clinical Trace Elements Laboratory.

Project 2: We are working on a method to interface gas chromatography with ICP-MS to measure specific mercury species in whole blood. The project will require the student to work with a senior staff member in setting up a GC, interfacing it to an ICP-MS instrument using a custom heated interface, and separating three mercury species, inorganic Hg2+, methylmercury and ethylmercury in a blood matrix. If time permits, we may explore implementing isotope dilution ICP-MS with GC separation for quantitation these Hg species in NIST SRM 955c. This project will conducted in collaboration with Dr. Christopher Palmer in the Clinical Trace Elements Laboratory.

For more information on new projects, check with Dr. Parsons, and visit our web site at http://www.wadsworth.org/testing/lead/index.htm.

Mentor: Thomas M. Semkow, Associate Professor, Biggs Laboratory, Room D486, Phone: 474-6071, E-mail: tms15@health.state.ny.us

Project 1: We are interested in the determination of alpha-emitting radionuclides in environmental samples for emergency response to incidents involving ionizing radiation, such as accidents and terrorist acts. Alpha emitters can be determined by counting, alpha spectroscopy, or mass spectroscopy. In this project we are concerned with the counting and alpha spectroscopy. There are a variety of research tasks which can be undertaken by interested students. The tasks include preparation of samples for alpha counting, measurements of alpha spectra using an ion chamber as well as counting on an ultra-low background proportional counter. Other assignments involve interpretation of spectra and plotting the results.

Project 2: This project involves reduction of radiation background in the existing WC environmental gamma radiation measuring facility. Gamma radiation measurements are
used is New York State mandated programs of ionizing radiation surveillance in water, air, food, vegetation, soil, as well as in nuclear emergency response. During 2006 and 2007, we have been participating in mapping out contamination of ground water from spent nuclear fuel tank at Indian Point nuclear reactor in Buchanan, NY. One of the persistent contaminants is cesium, a long-lived fission product which emits gamma radiation. In order to precisely determine the radioactive plume gradient, which is necessary for predicting the future plume behavior, one has to measure high and low levels of radioactivity, the latter requiring very low external radiation background. The rotation student involvement includes testing of plastic scintillators to detect cosmic-ray muons. The laboratory work consists primarily of working with electronic and computer instrumentation.

Mentor: David C. Spink, Ph.D., Associate Professor, E410, ESP. Phone: 486-2532, E-mail: spink@wadsworth.org

Project: Studies in our laboratory are focused on the complex interactions between estrogen and environmental contaminants in the initiation of human breast cancer. Estrogens have long been associated with breast cancer, because numerous risk factors for the disease relate to a woman’s lifelong exposure to endogenous and exogenous estrogen. While prevailing theories for the role of estrogen in carcinogenesis in the mammary gland have been focused on the stimulation of breast-cell proliferation by estrogen, there is also evidence that reactive metabolites produced by cytochrome P450 (CYP)-catalyzed metabolism of exogenous compounds and endogenous estrogens are involved in mutagenesis and breast cancer initiation. The aryl hydrocarbon receptor (AhR), which binds to and is activated by polycyclic aromatic hydrocarbons and other environmental contaminants, controls the expression of CYP1A1 and CYP1B1, enzymes that are known to catalyze the metabolism of numerous procarcinogens to ultimate carcinogens and estrogens to catechol estrogens.

Our research is based on the novel hypothesis that a significant role of estrogens in breast carcinogenesis is the up-regulation of AhR expression, leading to elevated expression and inducibility of the carcinogen-bioactivating enzymes, CYP1A1 and CYP1B1, and a greater propensity for mutations and the initiation of carcinogenesis. A laboratory rotation project would involve determining the time course, dose-response for estrogen, and effects of antiestrogens, LY117019 (Lilly) and ICI182780 (Tocris), on AhR, CYP1A1 and CYP1B1 expression in MCF-7 cells at the mRNA, protein and enzyme activity levels. This is a laboratory-based project.

Mentor: Xianliang Zhou, Ph.D., Assistant Professor, D498B (office) and D514 (lab), ESP. E-mail: zhoux@wadsworth.org

Project: Test and validation of measurement methods for atmospheric gaseous and particulate species, such as NO₂, nitrous and nitric acids, ammonia, amines, and aldehydes and ketones. Student is to assemble and test a measurement system based on aqueous phase scrubbing using a coil sampler, followed by a derivatization
procedure and photometric detection using an optical fiber spectrometer with a 1-m flow cell. Experiments are to be conducted to determine detection limit of the method and to examine potential interferences. This is a laboratory-based study.

Mentor: Lei Zhu, Ph.D., Associate Professor, D421C (office), D414 (lab), ESP. E-mail: zhul@wadsworth.org

Project: Study the OH Radical Initiated Oxidation of Acetylene in Air. Acetylene (C$_2$H$_2$) is released into the atmosphere from biomass burning and automobile tailpipe emissions. The first step in the OH-initiated oxidation of acetylene in air is addition of OH to the double bond with a high pressure rate constant of 8.0x10$^{-13}$ cm$^3$molecule$^{-1}$s$^{-1}$ at 298 K. The subsequent reaction of C$_2$H$_2$-OH adduct with O$_2$ has an estimated rate constant of 4x10$^{-12}$ cm$^3$molecule$^{-1}$s$^{-1}$. The primary mechanisms through which the C$_2$H$_2$-OH adduct could react with O$_2$ have been proposed as follows:

\[
\text{HOCH=CH}^+ + \text{O}_2 \rightarrow \text{HOCH=CHO}^+ \rightarrow (\text{CHO})_2^+ + \text{OH} \\
\text{HOCH=CH}^+ \rightarrow \text{HCOOH + HCO}
\]

One involves the addition of O$_2$ to the C$_2$H$_2$-OH adduct, to form a hydroxy peroxy radical intermediate followed by glyoxal and OH products. The other involves the addition of O$_2$ to the double bond, to form a four-membered cyclic intermediate followed by formic acid and HCO products. Nonetheless, the branching ratio of the glyoxal channel and the HCO channel from the OH-initiated oxidation of C$_2$H$_2$ in air has not been directly measured. Therefore, further work is needed.

The student will determine the branching ratios of the glyoxal channel and the HCO channel from the OH radical initiated oxidation of acetylene in air by using laser photolysis combined with cavity ring-down spectroscopy. The student will work with lasers, cavity ring-down spectrometer, and vacuum apparatus, and will learn how to analyze results. Laboratory based.

**Environmental and Occupational Health Track**

Mentor: Michael S. Bloom, Ph.D., Assistant Professor, School of Public Health, One University Place, Rensselaer NY 12144 Room 157. Tel.: (518) 473-1821, e-mail: mbloom@albany.edu

Students with an interest in environmental exposures, human reproduction, risk assessment and epidemiology are sought. I currently have two opportunities available for students with such interests. 1) We have conducted a pilot cohort study considering the impact of background exposures to trace elements on reproductive endpoints during in vitro fertilization. Exposure data has been captured from a variety of biological matrices including blood, urine, seminal fluid and follicular fluid. The goal of this project is to elucidate associations between these exposures and reproductive success including
oocyte fertilization in vitro and embryo development, which may be worthy of larger confirmatory studies. This project involves substantial statistical analysis of data as well as manuscript and grant application preparation. The opportunity for co-authorship is available. 2) We also have conducted a pilot hospital-based matched case-control study of drinking water arsenic and pregnancy loss in Romania. We have a very rich dataset comprising demographic information, medical, reproductive and occupational histories, detailed information related to the study pregnancy, as well as a reconstruction of drinking water arsenic exposure weighted by laboratory analysis of drinking water samples. This project also involves a good deal of statistical analysis and we are in the process of drafting manuscripts for publication as well as preparing grant applications for additional funding. The opportunity for co-authorship is available for this study as well.

Mentor: David O. Carpenter, M.D., Professor, Director, Inst. for Health & The Environment, One University Place, B Wing, Room B242, Rensselaer NY 12144, Tel: (518) 525-2660, -2661, Fax: (518)525-2665, e-mail: carpent@albany.edu.

Students could do one of three different rotations in my lab. They are as follows:
1. Use of state and national databases (NHANES, SPARCS, vital records, birth and death registries, toxic release inventory, NYS superfund site lists, NYS air pollution monitoring stations, census, etc.) to study the incidence of disease in relation to residence near to hazardous waste sites, toxic release sites and other sources of exposure to environmental contaminants.

2. Study of health of human populations exposed to environmental contaminants. Current projects include PCB and pesticide exposure in residents of the Mohawk Nation at Akwesasne, the Siberian Yupik people from St. Lawrence Island Alaska, and residents of Anniston, Alabama who live near to the Monsanto plant that manufactured PCBs. Other projects include study of air pollution and health outcomes in Karachi, Pakistan, health effects of living near to dry cleaning facilities in NYC that use PERC and contaminated drinking water and health in two slum communities in Uganda.

3. Risks vs. benefits of consuming fish and marine mammals from various sources. The risks derive from presence of methyl mercury and persistent organic contaminants that are fat soluble. The benefits derive from the healthy omega-3 fatty acids. Current study focuses on fish from the Great Lakes and Akwesasne and marine mammal consumption by Alaskan Native populations. Laboratory based.

Mentor: Ying Wang, Ph.D., Assistant Professor, Bureau of Environmental & Occupational Epidemiology, Center for Environmental Health, New York State Dept. of Health, 547 River Street, Flanigan Square - Room 200, Troy, NY 12180-2216 Phone: (518) 402-7990, Fax: (518) 402-7769, E-mail: wxy01@health.state.ny.us.

Project: Birth defects are the leading cause of infant mortality in the United States. Because the causes of about 70% of all birth defects are unknown, there continues to be concern about whether environmental pollutants cause birth defects, developmental disabilities, or other adverse reproductive outcomes. Utilizing the New York State Birth
Defects Registry’s data, research projects need to be developed to investigate whether various occupational hazards, genetic and dietary factors, medications, and personal behaviors cause or contribute to birth defects. Students will be involved in all phases of the epidemiologic study including generating hypotheses, developing study proposal and design, conducting data collection, analyzing data, presenting research findings and preparing reports/research papers. This project is office-based.

Mentor: **Lloyd R. Wilson**, Ph.D., Associate Professor, Bureau of Water Supply Protection, Center for Environmental Health, Corning Tower, Rm 1113, Empire State Plaza, Albany NY 12237, phone 402-7650: e-mail: lw03@health.state.ny.us.

Students interested in source water protection and drinking water supplies should contact Dr. Wilson to discuss possibilities for a rotation project. The work done in the Bureau of Water Supply Protection includes all aspects of implementing the Safe Drinking Water Act through oversight of public water supplies. The rotation may include field work, desk work and or laboratory work depending on the specific rotation desired and the current Bureau work. Examples of possible rotations include review of proposed regulations, participating in applied research like the presence of pharmaceuticals and other emerging contaminants in drinking water supplies, participating in comprehensive performance evaluations (CPE) of individual systems, PCBs in public supplies that use the Hudson River as a source of water, small system studies, and potential water issues with gas drilling in the Marcellus Shale. Interested students are encouraged to contact Dr. Wilson to work out details for a rotation experience desired.

**Toxicology Track**

Mentor: **Xinxin Ding**, Ph.D., Professor, E324, ESP. E-mail: dingx@wadsworth.org

Title: In vitro and/or in vivo drug metabolism in P450 transgenic/knockout mouse models

The aim of this project is to determine the role of P450 enzymes of a given tissue in the metabolism of drugs that are commonly used in clinical therapy, and yet have frequent adverse effects. In vitro analysis of drug metabolism will be performed using microsomal preparations from various tissues of P450 transgenic and/or knockout mouse models. In vivo drug metabolism will be analyzed through pharmacokinetics. The experiments will likely expose the student to a number of important techniques, including in vitro enzyme assays and enzyme kinetics; HPLC with UV, fluorescence, radioactivity, or mass spectrometric detection of drug metabolites; animal dosing and serum sample preparation; and pharmacokinetic analysis of drug disposition. Laboratory based.

Mentor: **Jun Gu**, Ph.D., Assistant Professor, E622, ESP, Wadsworth Center (518) 473-0782. E-mail: jxg19@health.state.ny.us
Project: The overall goal of our research is to study human toxicology and environmental diseases using molecular approaches. One of emphases is on determining the role of cytochrome P450 reductase (CPR) in the pathogenesis of Alzheimer's disease (AD). CPR, a drug-metabolizing enzyme, has been known to be involved in the production of reactive oxygen species (ROS), and numerous studies have implicated oxidative stress in the pathogenesis of AD. CPR may contribute to the amyloid beta protein-induced neuropathology in AD through its activities in ROS production. We are testing our hypothesis by developing and utilizing a novel amyloid precursor protein transgenic mouse model with defective expression of CPR. This study will provide a better understanding of the molecular basis of pathogenesis of AD. In addition, we are also studying the role of cytochrome P450 enzymes in chemical toxicity in the kidney using conditional gene knockout approach. Kidney contains a variety of drug metabolizing enzymes and transporters, and is a primary target for numerous xenobiotic toxicants including drugs and environmental chemicals. A better understanding of the molecular mechanism of chemical-induced renal toxicity will provide more effective methods for the prevention and clinical therapy of renal injury induced by xenobiotics.

Mentor: Ellen Braun-Howland, Ph.D., Assistant Professor, D672, ESP. E-mail: bhowland@wadsworth.org

Projects are designed for students on an individual basis. Laboratory based.

Mentor: Bruce Herron, PhD, Assistant Professor, CMS5239, Center for Medical Sciences. E-mail: bherron@wadsworth.org

The Herron lab has a focus on developing model systems relevant to human disease that can be used to better determine gene/environment interactions and the basis of complex traits. In particular our group is currently investigating the genetic basis of differential development between distinct inbred mouse strains. This rotation project would focus on assays that will be in one of three potential areas, vascular biology (e.g. screening agents for effects on angiogenesis), Epilepsy (biochemistry or molecular biology of tissues isolated from mice undergoing seizures, or molecular biology (PCR to genotype mice in mapping populations). Techniques will include cell culture, tissue isolation from mice, and basic molecular biology (e.g. PCR, DNA isolation).

Mentor: David A. Lawrence, Ph.D., Professor, Room 5020, DAI. E-mail: lawrencd@wadsworth.org

Four research projects are available in my laboratory of Clinical and Experimental Endocrinology and Immunology. Our focus is on immunotoxicology and neuroimmunotoxicology.

First, assessment of the mechanisms by which psychological stress alters immune responses, including host resistance against infections, via neuroendocrine mediators.
Second, investigation of autoantibodies to brain antigens, which induce neuropathy in diseases such as lupus, Parkinson’s disease and Alzheimer’s disease.

The third project involves the molecular mechanisms by which metals (arsenic, cadmium, lead, and mercury) and nanoparticles inhibit biosynthesis of important type-1 immunity (e.g., interferon-gamma production) which is a major cytokine responsible for cell-mediated immunity against intracellular pathogens and enhance type-2 immunity which is involved in allergies and asthma. Overall, the studies include biochemical, immunological and molecular analyses with emphasis on the molecular regulation of T-lymphocyte activation and generation of cytokines in the periphery and central nervous system.

The fourth project involves investigation of the genetic and environmental influences on biomarkers of stress. This project includes investigation of inbred strains of mice and humans and their sensitivity toward development of diseases that we hypothesize to have an autoimmune link such as autism.

Mentor: Veronica Miller, Ph.D., Research Assistant Professor, 5421, CMS. Phone: 518-402-2033, e-mail: vmiller@wadsworth.org

The incidence of developmental neurological disorders and brain-aging diseases is increasing and may involve exposures to environmental contaminants coupled with aberrant immune responses. Dr. Miller is interested in determining how environmental stressors contribute to the molecular pathogenesis of neurological disorders, particularly those associated with autonomic dysfunction. The Miller laboratory uses a combination of neuropathological analysis of post-mortem brain tissues in conjunction with modeling of disease processes, to uncouple the relationship between exposures to environmental stressors and behavioral and autonomic dysfunction. Our current work is funded by the Autism Research Institute. Specifically we aim to understand how gestational or perinatal environmental exposures may contribute to aberrant development of brainstem autonomic nuclei and autonomic dysfunction. We collaborate with analytical chemists, immunologists and toxicologists, and have technical expertise in neuroanatomy, neuropathology, digital image acquisition and analysis, and biochemical and chemical analysis of fresh and frozen tissues.

Mentor: Brian T. Pentecost, Ph.D., Adjunct Assistant Professor, E421, ESP Phone: 518-474-2165, e-mail: brian.pentecost@wadsworth.org

I am working on several aspects of estrogen receptor expression and its regulation of other genes. There is continuing interest in estrogen receptor action and expression due to its role in development and in breast cancer. A variety of xenobiotics may have ‘endocrine disruptor activity’ due to their interaction with the estrogen receptor. I can offer several projects in this area.
We have identified, by gene array approaches, a group of genes as regulated by an estrogen receptor that lacks a DNA binding domain. One might take some of the genes and attempt to analyze their expression using RealTime PCR assays in the Roche LightCycler in order to better understand the bases for their regulation or the action of estrogenic xenobiotics. This methodology and the related software tools would be applicable in many of the labs in EHS.

A second project could relate to siRNA suppression of CYP1A1 and IB1 which are important in metabolism of estradiol and which are induced by the dioxins and other ligands of the aromatic hydrocarbon receptor. Researchers in our group find that dioxins have anti-estrogenic effects and consider this to be due to induced estrogen metabolism. Other labs have evidence for alternate anti-estrogenic mechanisms and our goal is the dissection of AhR-mediated actions. Laboratory based.

Mentor: **JoEllen Welsh**, Ph.D., Empire Innovations Professor, Cancer Research Center, Rm 304D, University at Albany East Campus

jwelsh@albany.edu

591-7232 office

The Welsh lab uses cellular and molecular approaches and animal models to study nuclear receptors in development and cancer. Ongoing projects focus on the influence of nuclear receptors on mesenchymal stem cell lineage determination, the role of vitamin D receptor signaling in mammary gland development and breast cancer, and the effect of chemopreventive agents on ionizing radiation induced DNA damage in organ culture. Rotation students can participate in an ongoing project of their choice, and will be supervised by current graduate students or post-doctoral fellows.

Mentor: **Qing-Yu Zhang**, Ph.D., Associate Professor, E303, ESP. E-mail: zhangq@wadsworth.org

Project I: Genomic analysis of IE-Cpr-null mice

Students will perform genomic analysis of gene expression changes in a mouse model with intestinal epithelium-specific deletion of the NADPH-cytochrome P450 reductase gene (named the IE-Cpr-null mouse). The goal is to identify genes that are influenced by the loss of the reductase in the small intestine, possibly through disturbed homeostasis of endogenous signalling molecules or dietary chemicals that are normally metabolized by P450 enzymes in the small intestine. Techniques involved may include RNA preparation, PCR-based genotyping, microarray analysis, real-time PCR, immunoblot analysis, enzyme activity assays, and bioinformatics.

Project II: Drug metabolism in small intestine

Students will perform pharmacokinetic studies in WT and IE-Cpr-null mice, in order to determine the role of intestinal P450 enzymes in the metabolism of various drugs and the impact of such metabolism on oral drug bioavailability. Techniques involved may include HPLC with UV, fluorescence, or mass spectrometric detection of drug.
metabolites; animal dosing and serum sample preparation; and pharmacokinetic analysis of drug disposition.

Laboratory based.
All laboratory rotation forms
Can be downloaded from

http://www.albany.edu/sph/18694.php
Course Director: Ellen Braun-Howland, Ph.D. (B765 Biggs Lab; 473-7925; bhowland@wadsworth.org)

Office hours: By appointment

Prerequisites: None

Course description: This course will teach and promote critical reading of current literature in environmental health. Students will present for discussion at least once per semester a journal article pertaining to their area of interest. Areas from which articles will be selected include environmental chemistry, toxicology, pollution by chemicals and/or organisms, effects of the environment on the health of individuals or communities and measurement of environmental variables. This course will provide a skill that is essential for all graduate students: the ability to read and evaluate scientific literature critically. It will also expose students to a wide range of topics in environmental health and can, therefore, aid students in choosing an area of interest for their studies.

Course objectives: Students who complete this course should be able to:
1) Describe the public health impact of select chemical and biological toxicants;
2) Interpret results of scientific studies;
3) Discuss whether the data presented in a scientific paper justifies the conclusions.
4) Recognize flaws in experimental design/environmental studies.

Course competencies:
MPH Program, General competencies: 1. Acquire basic knowledge in the area of environmental health, including two of the three sciences relevant to environmental health: chemistry, toxicology and radiation sciences; 3. Understand the strengths and limitations of various laboratory methodologies to make value use of scientific data and their application to environmental health problems
MS and PhD programs, General competencies: Read, critically evaluate, and present scientific literature including justifying the choice of methods applied to problems and the interpretation of results obtained.

Course reading: One paper will be presented by a student each week. The student is responsible for notifying the class of his/her choice of reading at least one week prior to the class.

Writing assignments: Each week, students that are not presenting are responsible for a minimum one-page discussion of the public health significance of the topic of the paper assigned for that week (e.g., PCBs, cyanotoxins, asbestos). Students are also responsible for providing and asking three questions about the paper being presented that week.

Grades: Final grades are Pass/Fail, based on class participation (35%) quality of the written assignments (40%) and quality of the presentations (25%).

Paper presentations: The number of presentations per semester is dependent upon class enrollment. Papers will be presented using PowerPoint or the equivalent. Each presentation should be 40-45 minutes in length and comprise Background information, including the public health significance of the topic; an Introduction
to the paper, Methods, Results, and Discussion of the paper, including e.g., its contribution to the chosen field and quality of experimental design.

Course policies: Attendance is mandatory. If you are unable to attend class, please notify the instructor beforehand.

The presenter is responsible for contacting the PH Office (C236) and arranging for use of a laptop and/or projector.

Suggested journals:  *Toxicology and Applied Pharmacology*
*Molecular Pharmacology*
*Analytical Chemistry*
*Environmental Science and Technology*
*Water Research*
*Health Physics*
*Applied and Environmental Microbiology*

**Academic Integrity.** All students should be familiar with, understand, and behave according to the University’s standards of academic integrity. These standards, including examples of academic dishonesty, can be found in the Graduate Bulletin or at [www.albany.edu/studentconduct/standards_of_academic_integrity.php](http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). Student claims of ignorance, unintentional error, or personal or academic pressures will not be accepted as an excuse for violation of academic integrity.

Students unwilling to comply with the University’s standards of academic integrity will receive a failing grade for this course.
Meeting of Environmental Health Conscious Minds -- EHS 790  
Fall 2013 – Spring 2014

**Location:** Axelrod Theater, Biggs Laboratory on Tuesdays 3—4:00 pm.

**Course Directors**

- Hyunok Choi, Ph.D., Assistant Professor, hchoi@albany.edu, 402-0401; SPH Rm. #153.
- Haider A. Khwaja, Ph.D., Assistant Professor, khwaja@wadsworth.org, 474-0516; ESP Rm. #D 308.

**Office Hours:** By Appointment

**Course Description:** The course is required for all M.S. and Ph.D. students in Environmental Health Sciences. This course will expose students to a wide array of topics in the environmental health sciences through various seminars provided by experts in their respective fields. In addition, this course provides training in the public presentation of scientific material as well as the opportunity for students to perfect their skills in this area. In addition, faculty, postdocs, and invited speakers will attend and make presentations, which will foster interactions in an intellectual, scientific setting. This course incorporates the Blackboard Learning System at UAlbany.

**Learning Objectives:** Students will learn how to present a professional quality research seminar. The purpose of the course is several fold: to serve as a practice ground for giving seminars to scientists; to learn how to prepare for seminars; to present a student’s current research, experience during a laboratory rotation, or a topic of interest; to increase interactions between students, postdocs and faculty; and to provide a sounding board for ideas and problems related to students’ thesis research.

**Course Competencies:** This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:

- Present and orally defend knowledge gained in a public seminar.

**Prerequisites:** None.

**Credits:** Variable 0-1 contingent on semester of matriculation into the department.

**Grading:** S/U

**Course Requirements:**

- Grading for the Fall 2013 semester is based on attendance, critical written evaluation of seminars and delivery of a seminar. You will be required to complete an evaluation of each
student seminar using the course Blackboard website. All survey questions must be completed in a critical yet constructive fashion, by the deadline, in order to receive credit for seminar attendance. Course evaluations will be available for completion at 3:30 PM and are due by the following Tuesday at 2:00 PM. Although evaluations are not anonymous, speakers will only receive an aggregated summary of results, so your identity will not be made known. Seminars are evaluated on content, organization, quality of PowerPoint presentation, articulation of material and responses to questions.

- Each student is required to give a seminar appropriate for a general scientific audience on either their research or a topic approved by the course coordinators. Seminars must be 30 to 45 minutes, and will be followed by questions and discussion as time permits. Seminars must include visual material prepared with PowerPoint software. Students are required to present once per academic year. For the 2013-2014 academic year any students not presenting a seminar during the fall semester will be required to deliver a seminar during the spring semester.
- Drs. Khwaja and Choi will be happy to provide students with advice and feedback concerning the formatting and delivery of their material prior to the seminar. Students will receive feedback from their peers approximately one week after seminar delivery.
- YOU ARE EXPECTED TO BE AN ACTIVE PARTICIPANT IN EACH AND EVERY SEMINAR; WE ALSO EXPECT ALL SEMINAR ATTENDEES TO BEHAVE IN A PROFESSIONAL MANNER (PLEASE KEEP CONVERSATION TO AN ABSOLUTE MINIMUM); NO CELL PHONE IS ALLOWED DURING THE SEMINAR.

Additional Requirements: Be sure to LOG IN TO THE BLACKBOARD COURSE PAGE FREQUENTLY; the instructors will be using the Blackboard system to communicate all course related information. Be sure to have your UALBANY EMAIL FORWARDED TO WHATEVER EMAIL ADDRESS YOU FREQUENTLY USE. You are responsible for all communications made through the blackboard system. The speaker schedule is available on the Blackboard course page.

Attendance: Students are expected to attend ALL seminars. Should a conflict arise with a professional or academic obligation (i.e., conference), students must contact the instructors IN ADVANCE to be excused. If an emergency situation should arise, appropriate documentation will be required. For EACH unexcused absence or missed weekly evaluation, students will be required to write a 1 - 2 page scientific review paper on a topic assigned by one of the course instructors, in order to receive a satisfactory course grade. Note that official “part-time” students are required to attend only half of the seminars to fulfill their obligation.

Academic Integrity:
All students need to be aware of the University at Albany's standards of conduct as described in the booklet Community Rights and Responsibilities (http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and
honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic
integrity will be strictly enforced. Any violation of UAlbany’s Standards of Academic Integrity,
including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C
of the Community Rights & Responsibilities (see course information for a copy) will result in a
failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany
judicial system.
Preliminary Speaker Schedule for EHS 790, Fall 2013 & Spring 2014 Semesters (subject to change).

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Seminars in Environmental Health Sciences
EHS 790
Course Syllabus
Spring 2013

Location:
Axelrod Theater, Biggs Laboratory on Tuesdays 2:30 to 3:30 pm; 1/29/13-5/7/13 (no class 3/19/13)

Course Directors:
• Robert L. Jansing Ph.D., Assistant Professor, jansing@wadsworth.org, 473-0321 ESP Rm. #D622.
• Michael S. Bloom, Ph.D., Assistant Professor, mbloom@albany.edu, 473-1821; SPH Rm. #157.

Office Hours:
By Appointment.

Course Description:
The course is required for all M.S. and Ph.D. students in Environmental Health Sciences. This course will expose students to a wide array of topics in the environmental health sciences through various seminars provided by experts in their respective fields. In addition, this course provides training in the public presentation of scientific material as well as the opportunity for students to perfect their skills in this area. Faculty, postdocs, and invited speakers will also attend and make presentations, which will foster interactions in an intellectual, scientific setting. This course incorporates the Blackboard Learning System at UAlbany.

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Students will learn how to present a professional quality research seminar. The purpose of the course is several fold: to serve as a practice ground for giving seminars to scientists; to learn how to prepare for seminars; to present a student’s current research, experience during a laboratory rotation, or a topic of interest; to increase interactions between students, postdocs and faculty; and to provide a sounding board for ideas and problems related to students’ thesis research.

Course Competencies: This course teaches topics and skills that relate to competencies considered critical by the Department of Environmental Health Sciences including:
• Present and orally defend knowledge gained in a public seminar.

Prerequisites: None.

Credits: Variable 0-1 contingent on semester of matriculation into the department.

Grading: S/U

Course Requirements:
Grading for the spring 2013 semester is based on: 1) attendance, 2) critical written evaluation of seminars, and 3) delivery of a seminar. You will be required to complete an evaluation of each student seminar using the course Blackboard website. All survey questions must be completed in a critical yet constructive fashion, by the deadline, in order to receive credit for seminar attendance. Course evaluations will be available for completion at 3:30 PM and are due by the following Tuesday at 2:00 PM. Although evaluations are not anonymous, speakers will only receive an aggregated summary of results, so your identity will not be made known. Seminars are evaluated on content, organization, quality of PowerPoint presentation, articulation of material and responses to questions.

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Drs. Jansing and Bloom will be happy to provide students with advice and feedback concerning the formatting and delivery of their material prior to the seminar. Students will receive feedback from their peers approximately one week after seminar delivery.

You are expected to be an ACTIVE PARTICIPANT in each seminar; we also expect ALL SEMINAR ATTENDEES to BEHAVE IN A PROFESSIONAL MANNER (e.g., please keep conversations to an absolute minimum).

Additional Requirements:
- Be sure to LOG IN TO THE BLACKBOARD COURSE PAGE FREQUENTLY; the instructors will be using the Blackboard system to communicate all course related information. Be sure to have your UALBANY EMAIL FORWARDED TO WHATEVER EMAIL ADDRESS YOU FREQUENTLY USE. You are responsible for all communications made through the blackboard system. The speaker schedule is available on the Blackboard course page.

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- Students are expected to attend ALL seminars and complete evaluations for student speakers. Should a conflict arise with a professional or academic obligation (e.g., conference), students must contact the instructors IN ADVANCE to be excused. If an emergency situation or illness should arise, a determination will be made by the instructors (appropriate documentation may be requested). For EACH unexcused absence or missed weekly evaluation, students will be required to write a 1 PAGE single-spaced scientific review of the missed seminar topic in order to receive a satisfactory course grade. Electronic submission of the 1 page summary is due within two-weeks of the missed seminar (please submit simultaneously to Drs. Jansing and Bloom by email). The review will be evaluated by the instructors for quality and either accepted or returned to the student for revision.

Academic Integrity:
- All students need to be aware of the University at Albany's standards of conduct as described in the booklet Community Rights and Responsibilities
(http://www.albany.edu/studentconduct/standards_of_academic_integrity.php). This document itemizes the standards related to academic dishonesty, provides complete definitions of each type of misconduct and summarizes the penalties for violations of academic integrity. Please familiarize yourself with the contents of this document. Should problems arise during this course, a lack of knowledge of the content of this document cannot be used as a defense in determining the outcome of possible violations of the standards. We take academic integrity and honesty very seriously; a ZERO TOLERANCE POLICY with regard to violations of academic integrity will be strictly enforced. Any violation of UAlbany’s Standards of Academic Integrity, including plagiarism, cheating, multiple submission, sabotage, etc. as described in Appendix C of the Community Rights & Responsibilities (see course information for a copy) will result in a failing grade for the course with no opportunity for withdrawal, and referral to the UAlbany judicial system.

**Preliminary Speaker Schedule for EHS 790, spring 2013 Semester (subject to change).**

<table>
<thead>
<tr>
<th>Date</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>1/29</td>
<td>Dr. Adela Salame-Alfie</td>
</tr>
<tr>
<td>2/5</td>
<td>Dr. Larry Schell</td>
</tr>
<tr>
<td>2/12</td>
<td>Dr. Simona Surdu</td>
</tr>
<tr>
<td>2/19</td>
<td>Sherine El-Dars</td>
</tr>
<tr>
<td>2/26</td>
<td>Matthew Hartog</td>
</tr>
<tr>
<td>3/5</td>
<td>Justin Truax</td>
</tr>
<tr>
<td>3/12</td>
<td>Aubrey Galusha</td>
</tr>
<tr>
<td>3/19</td>
<td>No Class - Spring Break</td>
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<tr>
<td>3/26</td>
<td>Stacey Chmura</td>
</tr>
<tr>
<td>4/2</td>
<td>Anthony Dejulio</td>
</tr>
<tr>
<td>4/9</td>
<td>Nataliia Kovalchuk</td>
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<tr>
<td>4/16</td>
<td>Chibuzo Ilonze</td>
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<tr>
<td>4/23</td>
<td>Shedrack R. Nayebare</td>
</tr>
<tr>
<td>4/30</td>
<td>Xiaoyu Fan</td>
</tr>
<tr>
<td>5/7</td>
<td>Celeste Butts</td>
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</tbody>
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