Environmental Toxicology
3 credit hours

Sept 22 2008 DRAFT version (living document subject to change)

CHEM 455/655, BIOL F??; Lecture Reichardt ??? (unless otherwise indicated, for example – tours, wet lab exercises, etc.)

Course Coordinator: O’Hara. Teaching Assistants: Dr. Post Doc
[This is to be a shared course, O’Hara proposes time for 50% of the course and Echem will need to provide a 50% faculty member’s time for the course or funds to cover 50% for B&W to cover the time via a Post Doc).

Guest Lecturers: ???

3 Credits Offered Alternating Years (start spring 2010?)

Environmental toxicology will focus on the general properties and principles of persistent and/or poisonous (toxic) chemicals commonly encountered in air, water, fish and wildlife. Numerous natural and synthetic chemicals in the environment will be discussed from a global perspective with some bias towards arctic and subarctic regions. Special fees apply. Prerequisites: CHEM F451 or equivalent biology course. (3+0); permission of instructor is encouraged.

Origin, funding and mission: This course is encouraged and sponsored by the Environmental Chemistry faculty, Department of Biology and Wildlife, and the Alaska INBRE program to fill an important niche for addressing “contaminants in the environment and related biota.”

Grading: Course is taken for a letter grade, and possibly audit. This course is targeting undergraduate and graduate students with an interest or research project in “Toxicology”, but anyone (agency biologists, managers, industry representatives, etc.) is eligible and must get approval of the Course Coordinator (fftmo@uaf.edu, office 907-474-1838) to register.

The ideal class size will be 15-20 students so we can accommodate the class with respect to field trips (visiting and working in research laboratories, tours of facilities, constructive discussion groups, etc.), and to allow oral and written exercises (W, O course).

Exams:
Three examinations that will focus on the 3 major sections will be administered.
Each exam is 100 points (3 * 100 points = 300 points for exams) and will be multiple choices, true and false, and short essay format.
Two oral presentations (O, 10 minutes each) and two written exercises (W, 10-12 pages) will be count as 50 points each (200 points total)
Quizzes (announced and “surprise”), homework, discussion participation, etc. will be an additional 100 points and are mostly based on afternoon laboratory and discussion activities.

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<tr>
<th>Category</th>
<th>Points</th>
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<tr>
<td>Exams</td>
<td>300</td>
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<tr>
<td>W and O assignments</td>
<td>200</td>
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<td>Quizzes, homework, etc.</td>
<td>100</td>
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<td>Undergraduate Total</td>
<td>600</td>
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Graduate level credit will be earned via tests, oral presentations, and associated papers as for the undergraduates. However, graduate student papers will require analyses of data (e.g., statistics) and hypothesis driven papers (W, 15-20 pages) and presentations (O, 20 minutes each), these products will be double the point value as compared to the undergraduates and intensively scrutinized by 2-4 faculty. For written examinations, there will an additional in-depth essay question for the graduate students (in addition to undergraduate exam but within same time frame for testing). Graduate students must perform very well with respect to written and oral assignments.

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<th>Sections</th>
<th>Points</th>
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<tr>
<td>Exams</td>
<td>300</td>
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<td>W and O assignments</td>
<td>400</td>
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<tr>
<td>Quizzes, homework, etc.</td>
<td>100</td>
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<tr>
<td>Undergraduate Total</td>
<td>800</td>
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Audit: attend approximately 80% of course and take all exams (no minimum score required). We are very flexible on this. All students must be registered to attend.

100-90% = A, 89-80% = B; 79-70% = C; 69-55% = D; <55% fails. No plus or minus grades. “Curving” will be considered but not likely needed.

Class schedule:
Tuesday and Thursday schedule is ideal to allow a class period long enough to accommodate the presentations and field trips.
Env. Toxicology Course Outline

Section 1: Nuts and Bolts of Environmental Toxicology.

Lecture 1 and 2: Introductions to Environmental Toxicology (O’Hara)

Purpose is for leveling: to bring students to a certain level of basic toxicology understanding. In other words, get the chemistry students thinking biologically; and get the biology students thinking chemically!

Lecture 3, 4 and 5 (O’Hara)
Definitions and Basic Principles of Env Tox (the foundation of the course)

Lecture 6 (O’Hara)
Field Trip: Timothy S. Howe, Research Professional Alaska Stable Isotope Facility Water & Environmental Research Center, University of Alaska Fairbanks

Lecture 7 and 8
Whole animal and environmental toxicology (Hg as the example toxicant, along with other metals)

Lecture 9 Exam 1 (Lectures 1-8)

Section 2 “Mechanisms” of Environmental Toxicants

Lecture 9 and 10
Mechanisms of Toxicity:
    A) Interaction with Target B) Cellular dysfunction and toxicity C) Repair or Disrepair

Lecture 11 and 12:
    A) Carcinogenesis B) Genetic Toxicology

Lectures 13 and 14 oral presentations by students, written reports handed in.

Lecture 15 Toxicology Organ directed toxicity: Too many organs to do them all, overview of all and select a few organs for details including liver, kidney and brain.

Lecture 16: Exam 2 (Lectures 9-15)

Section 3 Interpreting/ Understanding/ Managing Environmental Environmental Toxicants (Observed Concentrations)

Lecture 17-20: Organohalogens in fish and mammals, some other organics as well (e.g., antibiotics).

Lecture 20-24: Heavy Metals in fish and mammals.

Lecture 25: Radionuclides in fish and mammals.

Lecture 26-27 oral presentations by students, written reports handed in.
Lecture 28 - Review

EXAM 3 (Final, lectures 17-28): TBD