Environmental Toxicology, 3 credit hours (lecture only)
Fall 2014, Tues & Thurs 945AM to 1115AM, REIC 165

September 3, 2014; DRAFT (living document subject to change, mostly based on student feedback)

CHEM 455/655, BIOL F 455 and BIOL F 656*
*note difference in number for graduate level course for BIOL F.

BIOL F455 CRN: 78032 & F656 CRN: 78035. CHEM F655 CRN: 78950 & 455 CRN: 78945

Prerequisites: CHEM F451; or BIOL F303; or one semester each of organic chemistry and cell or molecular biology; or permission of instructor.

Instructor: Todd O’Hara. tmohara@alaska.edu. 907 474 1838.
Office Arctic Health Research Building (AHRB) 182; Office Hours 830 to 1015AM on M, W, and F.
By appointment is preferred for review of draft papers, presentations, etc.


Course Description:
Environmental Toxicology will focus on the general properties and principles of persistent and/or 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. This is not a course in environmental chemistry.

Numerous graduate students study environmental contaminants across many Departments and require a basic course to better understand the principles that underlie their research and for the more specialized courses they may take. This toxicology course combines aspects of environmental science, vertebrate physiology and environmental chemistry in a manner to understand how systems are impacted and function.

Student Learning Outcomes:
Biology students will have a better understanding of chemistry with respect to environmental contaminants that helps them better assess biotic interactions with chemical components.
Chemistry students will acquire a better understanding of the chemical-biotic interactions and how biota alters the structure and dynamics of contaminants in the diverse ecosystems of the North.

Course Goals (more general):
We will break down the barriers and mystery of chemistry for the biologists and biology for the chemists giving them the opportunity to interact and learn from each other.

1) This course will provide the basic foundations for Environmental Toxicology
2) The essays, discussions, O and W exercises will allow students to focus on specific aspects of Environmental Toxicology that interests them with intensive feedback from the instructor and others (e.g., guest reviewers, classmates).
3) A better appreciation of the complexity of contaminant interactions in high latitude systems.

Origin and mission: This course is taught via the Department of Veterinary Medicine (Dr. O’Hara’s new academic home) and encouraged and sponsored by the Department of Chemistry and Biochemistry, and the Department of Biology and Wildlife to fill an important niche for addressing “contaminants in the environment and related biota.”

Grading: Course is taken for a letter grade (no + and – grades), and possibly audit. This course is targeting undergraduate and graduate students with an interest or research projects in “Toxicology”, but anyone (agency biologists, managers, industry representatives, etc.) is eligible. Please contact Todd O’Hara for more information (tmohara@alaska.edu).

The ideal class size will be 10 to 12 students so we can accommodate the class with respect to constructive discussion groups, and to allow oral and written exercises (W, O course) to be conducted during class time.
Exams:
Three examinations that will focus on the 3 major sections.
Each exam is 100 points (3 * 100 points = 300 points for exams) and will be multiple choice, true or false, and/or short essay format. The emphasis will be on writing. For each exam 60 points will emphasize writing, thus 180 points of the 300 possible points.

The oral presentations (O, 15 minutes each) and a written exercises (W, expected number pages based on graduate or undergraduate status) will count as 100 or 200 points each (200 to 400 points total based on graduate or undergraduate status). Each student will have two O and two W assignments (mandated by University for full O and full W). Topics must be presented to the Instructor for approval. During oral presentations we will have the entire class present and invite other students and faculty with the expectation to have >12 members in the audience (minimum of 5). Part of the grade for students will be participation during the Q&A session; they must be engaged for credit. Presentations must have a clear “introduction-body-conclusion” organization, appropriate to Environmental Toxicology and all will include visual aids. All presentations will receive evaluation by the instructor on oral communication competency (including responsiveness to audience questions), as well as on subject mastery. This can be done since students receive information/instruction in this course on effective speaking, effective responding, organization of material for effective presentation, and on development and use of media and visual aids. The written exercise (W, 10-12 pages double spaced, 1 inch margins, Arial 11 font) will undergo stages of review (with feedback to students) and at least one meeting to speak with the student about his or her writing. This allows for instructor review with grading so as to assist with instructions on scientific writing (this is mandatory for paper #2). The review will comprise 33.3% of the grade. Grading will consider the ultimate product quality and how the student responds to critical review.

Essay and essay-like assignments will be an additional 100 points and are mostly based on discussion activities and will typically cover the past week of lectures/presentations to highlight major points, involve specific questions (current events), and/or reading assignments (journal articles) the students will be expected to discuss as well as turn in reviews (essays). For example, we distribute a controversial paper on mercury in fish and ask students to choose a position on whether they should allow human consumption, or not. They must then defend their decision. It is not the decision they make that is graded but how they can articulate their perspective and defense of the decision. This has replaced what former students considered unpopular and less educational (homework and quizzes).

Undergraduate Students
<table>
<thead>
<tr>
<th>Exams</th>
<th>300 points [180 points for writing]</th>
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<tbody>
<tr>
<td>W and O assignments</td>
<td>200 points</td>
</tr>
<tr>
<td>Discussions/Short Essays</td>
<td>100 points [4 essays and 4 discussions, 25 pts each essay/discussion package]</td>
</tr>
<tr>
<td>Undergraduate Total</td>
<td>600 points [480 points of writing, 80%]</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 some type of analyses of data (e.g., statistics) and/or hypothesis driven papers (W, 10-12 pages, double spaced, 1 inch margins, Arial 11 font) and presentations (O, 15 minutes each = 10 minutes + 5 minutes for questions), these O and W products will be double the point value as compared to the undergraduates and intensively scrutinized by 2-3 faculty/staff members (guest reviewers). For written examinations, there will be 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.

Graduate Students
<table>
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<tr>
<th>Exams</th>
<th>300 points</th>
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<tbody>
<tr>
<td>W and O assignments</td>
<td>400 points</td>
</tr>
<tr>
<td>Discussions/Short Essays</td>
<td>100 points [4 essays and 4 discussions, 25 pts each essay/discussion package]</td>
</tr>
<tr>
<td>Graduate Total</td>
<td>800 points</td>
</tr>
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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 based on past offerings of this course.

Class schedule:
Since participation is important a part of the evaluation (grade) via essays/discussions, written and oral assignments **clearly requires attendance**. Excused absences will certainly be honored as compared to absence with no prior warning. Make up or remote examinations are possible with permission of the Instructor, but **not guaranteed**. Not attending class during discussions and presentations are not something that can be “made up” and if a student anticipates significant absences during these dates outlined below they should consider **not taking this course for a grade** (consider audit). Missing these days will result in a lack of participation and thus a lower overall score.

**Plagiarism is not tolerated.** When in doubt, properly cite the source. If plagiarism is highly suspected or obvious the product will be presented to the Dean of Students at the UAF for consideration and any action needed implemented (e.g., withdraw from the course, dismissed from UAF). Please recognize computer software is available to “search for” plagiarized text.

**Student Support Services include:**
**Disabilities Services:** The Office of Disability Services (http://www.uaf.edu/disability/) implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. This course works with the Office of Disabilities Services to provide reasonable accommodation to students with disabilities. However, I am not notified about these disabilities and it is the responsibility of the student to make me aware of this and any special considerations that UAF has suggested.
**UAF Office of Disability Services.** Whitaker Building, Room 208, 612 N. Chandalar, PO Box 755590, University of Alaska Fairbanks, Fairbanks, Alaska 99775-5590 **Phone:** (907) 474-5655  **E-mail:** uaf-disabilityservices@alaska.edu

**Writing Center** (http://www.uaf.edu/english/writing-center/): The center is located on the eighth floor of the Gruening Building. Students can receive help at the center at any stage in their writing process, from brainstorming to final editing. Tutors are available for one-on-one sessions and can help students with grammar, spelling, punctuation, organization, and style. Students who visit the center should bring a clean draft of the paper they are working on (double-spaced) and a copy of the instructor's assignment sheet.
801 Gruening Bldg., P.O. Box 755720, Fairbanks, Alaska 99775-5720, Phone: (907) 474-5314, Email: uaf-writing-center@alaska.edu
Env. Toxicology Course Outline Fall 2014

Section 1: Nuts and Bolts of Environmental Toxicology, Chapter 1.
First day of instruction; Thursday, Sept. 4 (will be a full period lecture)
[*Dr. O’Hara in DC with USEPA Sept 23 and 25; John Harley and Andrew Cyr will run class on these days.]

Sept 4 (Th), 9 (Tu):
Lectures 1 (A and B) and 2: Introductions to Environmental Toxicology;
Two lectures on Basic Toxicology that integrate C&D with Chapter 1, Chapter 3 pages 81-86.
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!

Sept 11, 16, 18:
Lectures 3, 4, 5, and 6; Chapter 2 and 3. Definitions and Basic Principles of Env Tox (foundation of the course)
Sept 11, 16 (50%): Lecture 3 and 4, Major Classes of Contaminants and their sources
Sept 16 (50%), 18: Lectures 5 and 6: ADME of ethanol and acetaminophen – chemicals of day to day personal use and social responsibility/concern used to explain ADME.

Sept 23, 25*; Lecture 7 & 8 [Andrew & John] Chapters 4 & 5. Bioaccumulation (Hg example toxicant, w/ other metals)

Sept 30*; Essay/Discussion (2 essays (W)/student) – Students will provide written essays (hard copy) on the topic of “bioaccumulation” for Dr. O’Hara to grade at the beginning of class (before discussion). Based on the two manuscripts provided by Mr. Cyr and Mr. Harley.

Oct. 9 (Th) Exam 1 (Lectures 1-8) [O’Hara at OSU (Columbus, Ohio)]. Based on student review of syllabus exam 1 is a week later. Maggie Castellini will proctor the exam.

Section 2 “Mechanisms” of Environmental Toxicants [October 2 to Nov 6; Nov 4 is section 3]

Oct 2 (Tu), 7 [Oct 9, 1st exam]; Lectures 9, 10 and 11. Ch. 6. Mechanisms of Toxicity: Molecular Effects & Biomarkers [Oct. 7 will be remote lecture from Ohio]

October 7th – draft of paper #1 due for optional review (but not graded); Date is FIRM no exceptions.

Oct 14 (Tu), 16; Lectures 12 and 13 Chapter 7: Cells, Tissues and Organs

October 16th (Th) – final of paper #1 due (to be graded); submit both electronically (email) and in writing

Oct 21, 23, and 28 oral presentations UAF (5 per day; total 3 day event, anticipate 15 students).

[18 minutes per student (90 minutes/5 students), total presentation is to be 15 minutes (10 minutes + 5 minutes for questions) with 3 minutes for transition to next speaker). Going over time will be penalized since this disrupts the schedule; just as would occur at a conference.]

Oct 30. Essays/Discussions (2 essays per student). Class consensus on 2 topics based on Section 2.

Nov. 6: Exam 2 (Lectures 9-13, plus student presentations) [Please note lecture on Nov 4 is NOT on this exam but for section 3]

Section 3 Interpreting/ Understanding/ Managing Environmental Toxicants

Nov. 4 and 11; Sublethal effects, Lecture 17-18, Chapter 8

[Nov. 6 O’Hara in Sitka; exam will be proctored by faculty or staff member]

Nov. 5th – draft of paper #2 last day for mandatory review (to be graded)

Nov. 13; Lethal Effects to Individuals, Lecture 19-20; Chapter 9
Nov 18: Effects of oil spills on wildlife [requested by previous students]

Nov 20 Lecture 23: Effects on Communities and Ecosystems, Chapter 11

Nov 25 Lecture 24: Landscape to Global Effects

Thanksgiving holiday Nov. 27–30 [No class Nov. 27]

Dec 2 –
Final of paper #2 due (to be graded); submit electronically and in writing
Discussion Group (Climate Change and Contaminants)

Dec 4, 9 and 11 oral presentations UAF (5 per day = 15 students!)

FINAL EXAM 3 (lectures 17-28): FINAL EXAM DAY.
Tuesday, Thursday 9:45-11:15 a.m.  8-10 a.m., Thursday, Dec. 18