Environmental Toxicology
3 credit hours (lecture only)
Fall 2012
MWF 10:30-11:30
REIC 203

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

BIOL F455 CRN: 74098 & F656 CRN: 74114. CHEM F655 CRN: 76941 & 455 CRN: 76930

Instructor: Todd O’Hara. tmohara@alaska.edu
Office Arctic Health Research Building (AHRB) 144; Office Hours 830 to 1015AM on M, W, and F.
By appointment is preferred for review of draft papers and presentations.

Michael C. Newman, CRC Press, Taylor and Francis Group; 541 pages. No Supplementary reading required
for purchase, primary literature will be provided by instructor.

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.

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

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
and that helps them better assess biotic interactions with chemical components.
For chemistry students they 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., classmates).
3) A better appreciation of the complexity of contaminant interactions in high latitude systems.
Origin and mission: This course is 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 or so 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 will be administered. 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.

An oral presentation (O, 15 minutes each = 10 minutes + 5 minutes for questions) and a written exercise (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). 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 (homework and quizzes).

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<th>Category</th>
<th>Points</th>
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<tr>
<td>Exams</td>
<td>300 points [180 points for writing]</td>
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<tr>
<td>W and O assignments</td>
<td>200 points</td>
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<tr>
<td>Discussions/Short Essays</td>
<td>100 points [4 essays and 4 discussions, 25 pts each]</td>
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<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 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.

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<tbody>
<tr>
<td>Exams</td>
<td>300 points</td>
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<td>W and O assignments</td>
<td><strong>400 points</strong></td>
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<tr>
<td>Discussions/Short Essays</td>
<td>100 points [4 essays and 4 discussions, 25 pts each]</td>
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<td>Graduate Total</td>
<td>800 points</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:
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 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 (203 WHIT, 474-7043) 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.

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. Tutors are also available to visit your classroom to talk about Writing Center services. Students who visit the center should bring a clean draft of the paper they're working on (double-spaced) and a copy of the instructor's assignment sheet. For more information, call Martha Bristow or Steve Carter at 474-5314.

Library resources (UAF): Copies of the required text are on reserve at the Biosciences Library (request made to Anne Christie at the AHRB). Digital versions might be available soon.
Env. Toxicology Course Outline Fall 2012

Section 1: Nuts and Bolts of Environmental Toxicology. [Aug 31 to Sept 28]. Chapter 1.

Aug 31, Sept 5, 7 (Sept 3 Labor Day – no class):
Lectures 1 and 2: Introductions to Environmental Toxicology;
2 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 10, 12, 14, 17, 19, and 21:
Lecture 3, 4, 5, and 6; Chapter 2 and 3. Definitions and Basic Principles of Env Tox (foundation of the course)

Sept 10, 12, 14: Lecture 3 and 4 Major Classes of Contaminants and their sources

Sept 17, 19, 21: Lecture 5 and 6: ADME of ethanol and acetaminophen – chemicals of day to day personal use and social responsibility/concern used to explain ADME.

Essay/Discussion (Sept 21, 1 essay (W)/student) – select a chemical to exemplify knowledge of ADME

Sept 24 & 26; Lecture 7 & 8. Chapters 4 and 5. Bioaccumulation (Hg as example toxicant, with other metals)

Sept 28 Exam 1 (Lectures 1-8)

Section 2 “Mechanisms” of Environmental Toxicants [October 1 to 26]

Oct 1, 3, and 5; Lectures 10 and 11. Chapter 6. Mechanisms of Toxicity: Molecular Effects and Biomarkers

October 5th – draft of paper #1 last day for optional review (but not graded)

Oct 8, 10, and 12; Lecture 12 and 13 Chapter 7: Cells, Tissues and Organs

October 12th – final of paper #1 due (to be graded); submit electronically and/or in writing

Oct 15, 17, 19, and 22 oral presentations UAF (3 per day).


October 26th: Exam 2 (Lectures 9-15)

Section 3 Interpreting/ Understanding/ Managing Environmental Toxicants

Oct 29 and 31; Sublethal effects, Lecture 17-18, Chapter 8

Nov. 2 and 5; Lethal Effects to Individuals, Lecture 19-20; Chapter 9 [guest lecturer, Dr. Carla Willetto on Nov. 2]

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

Nov 7 and 9; Effects of oil spills on wildlife [requested by previous students]
Nov 12 and 14 Lecture 23: Effects on Communities and Ecosystems, Chapter 11

Nov 16 and 19 Lecture 24: Landscape to Global Effects

**Nov. 19 - final of paper #2 due** (to be graded); submit electronically and/or in writing

Nov 21: Discussion Group (Climate Change and Contaminants)

Nov 22 and 23 no class (Thanksgiving)

Nov 26, 28, 30 and Dec 3: oral presentations UAF (3 per day).

**Dec 5 and 7** Essays/Discussion (2 essays per student), topics related to Section 3.

**EXAM 3** (lectures 17-28): December 10

Review Exam and Discussion on FINAL EXAM DAY.