Environmental Toxicology

Instructor: **Lawrence K. Duffy, 246 WRRB, lkduffy@alaska.edu, 474-7525**

Office Hours: Tuesday and Thursday following lectures. However students are encouraged to contact the instructor by phone or email at any time

Lecture: Tuesdays and Thursdays, 11:30 am – 1:00 pm. ~~Murie 103~~ Reich 202

Textbook: Fundamentals of Ecotoxicology 4th Edition (ISBN 978-14-666-58-2293) by Michael C Newman, CRC Press, Taylor and Francis Group. No supplementary reading required for purchase. Primary literature will be provided by instructor.

Course Description: This 3 credit course will discuss the basic components of environmental and ecotoxicology, and explores exposure of toxic chemicals to animals and plants and their impact on health and the ecosystem, using a One Health model. 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 toxicology course combines aspects of environmental science, vertebrate biochemistry and physiology and environmental chemistry in a manner to understand how systems are impacted and function.

Student Learning Outcomes:

- increase understanding of biochemistry with respect to environmental contaminants
- increase understanding of the chemical-biotic interactions
- gain an understanding of how biota alters the structure and dynamics of contaminants in the diverse ecosystems of the North

Course Goals:

This course will provide the basic foundations for Environmental Toxicology
The class will focus on specific aspects of Environmental Toxicology that interest the student
Develop an appreciation of the complex system of contaminant interactions in high latitude systems

Instructional Methods:

The teaching methods employed in this course will consist of lectures and "chalk talk" by the instructor. It is absolutely crucial that reading (see schedule) of sections is done in advance. Student essays and presentations on specific topics will also be used.

Grading:

Exams: There will be four term exams (50 points each); one for each major section of the course.
Oral class participation in the form of discussions will be included in the final grade (100 points). This entails an active involvement into the regular lecture materials discussed. Quiz/Class participation (100 points).

Undergraduate Students

Exams	400 points (4 exams 50 points each)
O assignments	100 points (Presentation)
Discussions	200 points (Discussions: 50 points per discussion package)
Undergraduate total	600 points (400 points O 66%)

Exams:

Four examinations that will focus on the three major sections

Each exam is 50 points (4*50 points = 200 points for exams) and will be multiple choice, true or false, and/or short essay format.

Orals:

The oral presentations (O, 15 minutes each = 10 points to present + 5 minutes for questions) will count as 100 or 200 points each. Each student will have 2 O assignments (mandated by the 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 > than 12 members in the audience (minimum of 5). Part of the grade for students will be participation during the Q and 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 including responsiveness to audience questions and subject mastery.

Course Policies

Attendance: Regular student attendance is expected to ensure consistent group activities and discussions.

Exams: 4 exams will be given. These exams will be a combination of multiple choice/short answer and essay questions (take home or in class). Makeup exams will only be allowed with pre-approval of the instructor or with an acceptable, documented reason such as unexpected illness, family emergencies or other unavoidable events.

Participation: Class participation entails an active interest aside form paper discussion/presentations. This includes but is not limited to answering questions during lectures, asking for clarifications, or contributing to ad hoc discussions.

Ethical Considerations: The Chemistry "Department Policy on Cheating" is as follows: *"Any student caught cheating will be assigned a course grade of F. The student's academic advisor will be notified of this failing grade and the student will not be allowed to drop the course."*

Plagiarism Policy

Plagiarism is defined as the use of "other" intellectual property without proper reference to the original author. *Intellectual property includes all electronic (**Internet**), spoken or print media*. Students are expected to cite all sources used in oral and written presentations. Cases of plagiarism will be taken seriously with a grade 0 for the particular assignment. Severe cases may be referred to the Department Chair or Dean or class failing considered.

Support Services

Support services will be provided by the University of Alaska Library system, online resources and the instructor. Additional services are available through Student Support Services (http://www.uaf.edu/sssp/) at UAF.

Disabilities Services

Students with a physical or learning disability are required to identify themselves to Mary Matthews in the Office of Disabilities Services (203 WHIT, 474-7043) located in the Center for Health and Counseling in order to receive special accommodations. The student must provide documentation of the disability. Disability Services will then notify me of special arrangements for taking tests, working homework assignments, and doing lab work.

See academic calendar on UAF website for important university dates. http://catalog.uaf.edu/calendar/calendar17-18/

Lecture	Chapter	Topic	Vignettes *
1		Syllabus	
2	1.1	History	
3	1.2	Science, Technology and Current Practice	1.1 Emergence of Ecotoxicology
4	1.3/1.4	Ecotoxicology and Precaution	
5	2.1/2.2	Types of Contaminants	2.3 History of Envirinmental Issues
6	3	Uptake	
7	3	Metals and Metaloids	4.1 Metal Spectrum
8	3	Biotransformation	
9	3	Elimination	
10	3	Accumulation	2.2 Pesticides in Central America
11	Chapters 1-3	**Exam 1**	
12	4	Bioavailability	4.2 Bioavailability of Metals
13	4	Chemical Influences (Water)	
14, 15	4	Biological Influences (Solids)	2.1 Endosulfan
16	4	Other Factors	
17	5	Assimilation from Food	5.1 Birds as Monitors
18	5	Trophic Transfer 1	5.2 Hg Trophic Transfer
19	Chapters 3-5	**Exam 2**	
20	6	Molecular Effects	
21	6	Phase 1	6.1 Cytochrome P450
22	6	Phase 2	
23	6	Biomarkers	6.2 Metallothioneins
24	6	Enzyme Dysfunction	
25	7	Necrosis/Apoptosis/Inflammation	7.2 Polycyclic Aromatic Hydrocarbons
26	Chapters 6-7	**Exam 3**	
27	8	Sublethal Effects	8.1 Hormesis
28	8	Selyean Stress	
29	11	Effects on Communities	8.4 Behavior in Ecotoxicology
30	12/13	Landscapes/Regions/Risk Assessment	11.1 Ecological Resilience
	Chapters 8,11,12,13	**Exam 4** (FINAL)	

* Research Projects or other Vignettes if approved by instructor