

CHEM 455 *1055*  
BIO 455/656  
CHEM 655

Environmental Toxicology  
Fall 2022

Lawrence K. Duffy  
*Revised.*  
9/9/2022

**Instructor:** Lawrence K. Duffy, 246 WRAB, [lkduffy@alaska.edu](mailto:lkduffy@alaska.edu), 474-7525, 907-978-9695

**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. *Room 201*

**Textbook:** Fundamentals of Ecotoxicology 4<sup>th</sup> 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 *and ecotoxicology*  
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 student presentations~~ by the instructor. It is absolutely crucial that reading (~~and student presentations~~) of sections is done in advance. *Student essays and presentations on specific topics will be required.* **TEXT BOOK**

**Grading:**

**Exams:** There will be four term exams (50 points each); one for each major section of the course.  
~~Grading participation in the form of questions will be included in the final grade (100 points).~~ This entails an active involvement into the regular lecture materials discussed. *Quizzes* (100 points).

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Four examinations that will focus on the three major sections  
Each exam is 50 points (4\*25 = 100 points for exams) and will be multiple choice, true or false, and/or short essay format.  
**Exam for 400**

### Orals: For Graduate Students

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 ~~an assignment~~ <sup>assignment</sup> ~~mandated by the university for Fall 2011~~. 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 ~~more 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) ~~examinations~~. 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 from 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.

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## **NOTES ON SYLLABUS AND UNIVERSITY POLICIES**

- 1. UAF is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual.**
- 2. This course follows the UAF policy Incomplete Grade Policy.**  
The letter "I" is a temporary grade used to indicate that the student has satisfactorily completed (C or better) the majority of the courses work, but for personal reasons beyond the student's control has not been to complete the course during the regular semester.  
Negligence or indifference are not acceptable reasons for an "I" grade
- 3. UAF "C" grade policy.**  
"C-" grade is not the same as a C for this course.
- 4. Speaking Center is available (807-474-5470)**
- 5. Writing Center is available (807-474-5314)**
- 6. Developmental MATH lab is available in the Gruening BLDG.**
- 7. UAF has information and resources on the ACADEMIC ADVISING RESOURCES LIST.**
- 8. EMERGENCY NOTIFICATION PLAN. (see student handbook)**
  - a. In class by instructor as a relay**
  - b. via phone and email**
- 9. Extended Absence Policy (see Student Handbook)**
  - a. Personal illness or injury**
  - b. bereavement**
  - c. military obligations**
  - d. Jury service**
  - e. Serious illness of family or friend**
  - f. other emergencies**
- 10. Technical Requirements**
  - a. Access to textbook**
  - b. Access to Internet**
  - c. access to a computer**
  - d. access to a phone**

**Students need a computer for online course material and the ability to upload or download material.**

# **COURSE OUTLINE**

<b>LECTURE</b>	<b>CHAPTER</b>	<b>TOPIC</b>
1	1	SYLLABUS
2	1.1	HISTORY OF ECOTOXICITY
3	1.2	CURRENT PRACTICE
4	1.3/1.4	PRECAUTIONARY PRINCIPLE
5	2.1/2.2	TYPES OF CONTAMINANTS
6		
7	3	UPTAKE
8	3	METALS/METALLOIDS
9	3	BIOTRANSFORMATION
10	3	ELIMINATION
11	3	ACCUMULATION
EXAM 1	CHAPTERS 1&2	
12	4	BIOAVAILABILITY
13	4	CHEMICAL INFLUENCES
14	4	BIOLOGICAL INFLUENCES
15	4	"
16	4	"
17	4	OTHER FACTORS
18	5	ASSIMILATION FROM FOOD
EXAM 2	5	TROPIC TRANSFER
19	CHAPTERS 3, 4 & 5	
20	6	MOLECULAR EFFECTS
21	6	PHASE 1
22	6	PHASE 2
23	6	BIOMARKERS
24	6	ENZYME DYSFUNCTION
25	7	NECROSIS/APOPTOSIS
EXAM 3	7	INFLAMMATION
26		
27	CHAPTERS 6&7	
28	8	SUBLETHAL EFFECTS
29	8	SELVYAN STRESS
30	11	EFFECTS ON COMMUNITIES
EXAM 4 (FINAL)	12	LANDSCAPES
	13	RISK ASSESSMENT
	CHAPTERS 8, 11&12	

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## Syllabus Addendum (Revised 8/10/2021)

**COVID-19 statement:** Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website:

<https://sites.google.com/alaska.edu/coronavirus/uaf?authuser=0>

Further, students are expected to adhere to the university's policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

**Student protections statement:** UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: <https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/>.

**Disability services statement:** I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

### Student Academic Support:

- Speaking Center (907-474-5470, [uaf-speakingcenter@alaska.edu](mailto:uaf-speakingcenter@alaska.edu), Gruening 507)
- Writing Center (907-474-5314, [uaf-writing-center@alaska.edu](mailto:uaf-writing-center@alaska.edu), Gruening 8th floor)
- UAF Math Services, [uafmathstatlab@gmail.com](mailto:uafmathstatlab@gmail.com), Chapman Building (for math fee paying students only)
- Developmental Math Lab, Gruening 406
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120, <https://www.ctc.uaf.edu/student-services/student-success-center/>)
- For more information and resources, please see the Academic Advising Resource List ([https://www.uaf.edu/advising/lr/SKM\\_364e19011717281.pdf](https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf))

### Student Resources:

- Disability Services (907-474-5655, [uaf-disability-services@alaska.edu](mailto:uaf-disability-services@alaska.edu), Whitaker 208)
- Student Health & Counseling [6 free counseling sessions] (907-474-7043, <https://www.uaf.edu/chc/appointments.php>, Whitaker 203)
- Center for Student Rights and Responsibilities (907-474-7317, [uaf-studentrights@alaska.edu](mailto:uaf-studentrights@alaska.edu), Eielson 110)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, [asuaf.office@alaska.edu](mailto:asuaf.office@alaska.edu), Wood Center 119)

**Nondiscrimination statement:** The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at [www.alaska.edu/nondiscrimination](http://www.alaska.edu/nondiscrimination). For more information, contact: