

## ENVIRONMENTAL TOXICOLOGY (BIO 260)

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### Meeting Times (Winter Semester, 2007)

Lecture: MWF 12:05 - 1:00<sup>pm</sup> in Carnegie 111  
Laboratory: Monday 1:05 - 4:00<sup>pm</sup> in Carnegie 524

### Office Hours

### Class Email Address

Tuesday 1:00<sup>pm</sup> to 2:30<sup>pm</sup> wbio260a@bates.edu  
Wednesday 10:30<sup>am</sup> to 12:00<sup>pm</sup>  
or by appointment

### Course Description

Environmental toxicology is the study of pollutants and their effects upon organisms and the structure and function of ecological systems. It encompasses a variety of disciplines including ecology, chemistry, organismal and developmental biology, genetics, epidemiology, and mathematics. This course provides an overview of the field by discussing 1) major classes of pollutants; 2) introduction, movement, distribution and fate of pollutants in the environment; 3) sites and mechanisms of action of pollutants; and 4) impacts of pollutants upon organisms and ecosystems. Basics of toxicity testing design and analysis are an important part of the laboratory.

### Required Textbooks

*Principles of Ecotoxicology*, C.H. Walker, S.P. Hopkin, R.M. Sibly, and D.B. Peakall, 3<sup>rd</sup> ed., Taylor and Francis Ltd., Bristol, PA, 2006.

*Principles of Environmental Toxicology*, I.C. Shaw and J. Chadwick, 1<sup>st</sup> ed., Taylor and Francis Ltd., Bristol, PA, 1998.

### Final Grades

	<u>Points</u>	<u>Percent of Final Grade</u>
Lab Reports/Assignments	210	35%
Exam 1	90	15%
Exam 2	90	15%
Case Study	90	15%
Cumulative Final Exam	120	20%
Total:	600 points	100%

Attendance and participation are expected and may be considered in final grade determination.

<u>Date</u>	<u>Lec.</u>	<u>Lab.</u>	<u>Topic</u>	<u>Required Readings</u>
M Jan 8	1		What is Environmental Toxicology?	Walker et al. pp. xiii-xvi Shaw and Chadwick Chp 1, pp 1-9
W Jan 10	2		Major Classes of Pollutants	Chp 1, pp 3-22 Chp 1, pp 9-17
F Jan 12	3		Pollutant Entry into the Env.	Article: <i>Amazing Organohalogen</i> Chp 2, pp 23-31
M Jan 15			<i>Martin Luther King Jr. Day – No lecture and no laboratory</i>	
W Jan 17	4		Movements of Pollutants	Chp 3, pp 34-43
F Jan 19	5		Movements of Pollutants – Ground water contamination	
M Jan 22	6		Fate, Bioaccumulation and Transfer along the Food Web	Chp 4, pp 45-56 Chp 6, pp 115-126 Chp 5, pp 57-63 Chp 2, pp 21-31 Chp 5, pp 76-83
W Jan 24	7	1	<i>Laboratory: Groundwater Contaminant Computer Simulation</i> Toxicity Testing	Chp 6, pp 87-108 Chp 3, pp 47-64
F Jan 26	8		Toxicity Testing continued	Chp 9, pp 141-148 Chp 5, pp 98-108
M Jan 29	9		Metabolism and Degradation	Chp 5, pp 63-76 Chp 6, pp 127-141
W Jan 31	10	2	<i>Laboratory Daphnia Toxicity Test Part 1: Range Finding</i> Environmental Monitoring	<b>Groundwater Contaminant Simulation Worksheet Due in Lab</b> Chp 4, pp 66-97
F Feb 2			Biomarkers	Chp 10, 149-163
M Feb 5	11		Biomarkers continued	Environ. Health Perspect. Articles
W Feb 7	12	3	<i>Laboratory Daphnia Toxicity Test Part 2: Dose-Response</i> Catch-up and review for Exam 1	
F Feb 9	13		<b>EXAM 1</b>	
M. Feb 12	14		Risk Assessment	
W Feb 14	15	4	<i>Laboratory Biomarker Part 1: RNA Isolation</i> <b>Daphnia Laboratory Report Due in Lab</b>	
F. Feb 16	16		Risk: Assessment and Management Article: <i>Who's Exaggerating?</i> Risk Assessment continued	
M-F Feb 19-23			<i>Winter Recess - No Class, no laboratory</i>	
M Feb 26		5	<i>Laboratory Biomarker Part 2: Northern Gel and Lift</i> <i>Start Laboratory at Noon today!</i>	
W Feb 28	17		Assessing a Study's Validity and Power	
F Mar 2	18		Effects on Individuals	Chp 8, 131-140
M Mar 5	19		Mechanisms of Toxicity	
W Mar 7	20	6	<i>Laboratory Biomarker Part 3: Northern Detection</i> Mechanisms of Toxicity: Cancer	Chp 7, 109-121
F Mar 9			<b>Exam 2</b>	

M Mar 12	21		Mechanisms of Toxicity: Cancer	
		7	<i>Laboratory: Ames Test</i>	
W Mar 14	22		Biological Monitoring	Chp 11, 165-178
			<b><i>Biomarker Laboratory Due in class</i></b>	
F Mar 16	23		Population Dynamics	Chp 12, 182-208
M Mar 19	24		Evolution of Resistance	Chp 13, 209-227
		8	<i>Laboratory: Env. Tox. Field Trip</i>	
W Mar 21	25		Biomarkers in Population Studies	Chp 15, 243-257 Chp 16, 259-274
			<b><i>Field Trip 1-2 page Summary Due in class</i></b>	
F Mar 23	26		Communities and Ecosystems	Chp 14, 229-242
			<b><i>Ames Test Laboratory Due in class</i></b>	
M Mar 26			No lecture or laboratory: Time to Work on Case Study Assignment	
W Mar 28			No lecture (I'm attending the National SOT Meeting, March 25-29, 2007)	
F Mar 30	27		Communities and Ecosystems continued	
M Apr 2	28		Key Indicator Species	
		9	<b><i>Laboratory: Case Study Presentations</i></b>	
W Apr 4	29		Remediation and Prevention	
F Apr 6	30		Catch-up and Final Exam Review	
F Apr 13	<b>10:30<sup>am</sup></b>		<b>CUMULATIVE FINAL</b>	

### Course Requirements

Lab Reports Lab reports will be written in journal format (Abstract, Introduction, Materials and Methods, Results, Discussion, and References). A minimum of 5-7 references from primary literature are required. Laboratory reports are due 1-2 weeks after completing the laboratory experiment, as indicated above, for the Daphnia, Biomaker and the Ames Test laboratories.

### Laboratory Assignments will be:

Simulation Worksheet	25
Daphnia Laboratory Report	50
Biomarker Laboratory Report	75
Field Trip Summary	10
Ames Test Laboratory Report	<u>50</u>

210 points possible for the laboratory portion of the course

Case Study Students will work in groups of two to prepare an ecotoxicological case study. Students may choose from provided topics, or have the option of choosing their own topic. However, all case study topics must be approved by me. Additional information about the case study assignment will be given in class. **The Case Study written report and a 25-minute presentation (Powerpoint or overheads or is due on Monday, April 2<sup>nd</sup>**. Students will submit a fair evaluation of effort for their partner. The peer evaluations may add to, or subtract from, the group grade to formulate each individual's grade.

Exams Exams will be a mix of objective and essay questions and will test materials from lecture, laboratory and readings. More information about the exams, including sample exam questions, will be given in class. Note that the final exam is comprehensive.

Tentative Grading Curve for the Course

90-100 % of total points = some kind of A

80- 89 % of total points = some kind of B

70- 79 % of total points = some kind of C

60- 69 % of total points = some kind of D

≤ 59 % of total points = F

**Plagiarism and Academic Misconduct is Unacceptable**

It is the responsibility of each student to read and understand the Bates College Statement on Plagiarism that is published as a handbook and distributed to all incoming students and the Bates College Code of Student Conduct (<http://www.bates.edu/x35306.xml>). Intellectual honesty is of paramount importance in your education and in maintaining the free and open intellectual life of the college. If you do not fully understand what constitutes plagiarism, please see an instructor for clarification and check out the Bates College Website on plagiarism: (<http://abacus.bates.edu/pubs/Plagiarism/plagiarism.html>). Individuals or groups committing plagiarism or other academic misconduct will receive no credit for the work in question, may fail the course and will be referred to the Dean of Students for disciplinary action by the College.