

## **BIOL 4710: Aquatic Toxicology (4 credits)**

**Instructor:** Dr. Gretchen Bielmyer

Office: BC 1097

Office hours: Monday and Wednesday, 2:00 – 3:30 p.m. and by appointment

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**Course Description:** This course will examine different classes of contaminants in aquatic environments and their interactions with aquatic organisms. We will discuss methods of toxicity testing, contaminant effects at different levels of biological organization, and environmental regulations. Toxicology integrates biology, chemistry and other scientific disciplines and demonstrates a practical application of this knowledge. Students will be able to use their knowledge in lab and conduct toxicity tests with a variety of organisms.

### **Course Goals:**

By the end of the semester students will be able to

- Apply their acquired knowledge to better understand the interactions between toxicants and the environment
- Distinguish between different classes of toxicants and their general effects on aquatic life
- Exhibit an understanding of environmental regulations
- Express themselves clearly, logically and precisely in scientific writing and in speaking
- Demonstrate knowledge of Aquatic Toxicology principles and laboratory procedures
- Interpret data pertaining to the behavior of the individual organism in its natural environment; to the structure and function of populations, communities, and ecosystems; and to human impacts on these systems and the environment.
- Enhance existing laboratory skills and learn new techniques

### **Educational Outcomes**

This course will help the students achieve VSU General Education Outcome # 1 which states that students will express themselves clearly, logically and precisely in writing and in speaking. The proposed course will also help students achieve VSU General Education Outcome #2 which states that students will demonstrate knowledge of scientific and mathematical principles and proficiency in laboratory practices, as well as Biology Educational Outcome # 5, stating that students will interpret ecological data pertaining to the behavior of the individual organism in its natural environment; to the structure and function of populations, communities, and ecosystems; and to human impacts on these systems and the environment.

### **Optional Materials:**

**Text:** Rand, G.M. Fundamentals of Aquatic Toxicology: Effects, Environmental Fate, and Risk Assessment. CRC Press, 1995. ISBN 1560320915, 9781560320913

### **Required Materials:**

**Laboratory Notebook:** Spiral bound

**Graded Course Components:** Your final grade will be based on your performance on lecture examinations, an oral presentation, participation in class discussions and journal article assessments, and laboratory assignments.

**Lecture:** (550 pts) There will be 3 lecture exams followed by a cumulative final exam. Students are required to learn the lecture material and the supplemental readings for all exams. Exam format will be specified by your instructor. Each of the exams will be worth 100 points. There are NO MAKEUP EXAMS. A missed exam will be equal to zero points. Students will also be required to give an oral presentation, read and answer questions about journal articles, and participate in classroom

discussions.

**Laboratory:** (150 pts) Laboratory reports will be assigned for each exercise and comprise the majority of the laboratory grades. There are NO makeup laboratories. Late assignments will not be accepted.

**Grade Calculation & Distribution:** Final grades will be based on a percentage of your cumulative points relative to the total points possible. See below chart.

Grade Calculation		Grade Distribution		
Type	Points	Letter	Percentage	Point Range
Exam 1	100	A	90-100%	630-700
Exam 2	100	B	80-89%	560-629
Exam 3	100	C	70-79%	490-559
Final Exam	100	D	60-69%	420-558
Oral Presentation	75	F	≤ 59%	≤ 419
Journal Articles	60			
Participation	15			
Laboratory	150			
<b>Total</b>	<b>700</b>			

**Attendance:** Attendance in this course is absolutely required. Students should be seated at the beginning of class. If you are late, your attendance may not be acknowledged. The student is responsible for all material missed regardless of the reason for absences. If you have three unexcused absences from lecture your grade will drop one letter grade. Each absence above three will result in another drop in letter grade.

**Procedure for exams:**

- No books, electronic devices, or notebooks will be allowed during exams. Students using such items will be asked to leave and will receive a zero for the exam.
- No talking will be allowed during the exam, but students are permitted to ask the instructor questions.
- Each student will be given an exam to be completed and handed back to the instructor.
- Students will take the exam during the stated lecture time only.

**Student identification:** Students should have in their possession at all times their VSU student identification card. In order to verify the identification of students officially enrolled in the course, it is the instructor's prerogative to request official student photo identification cards at any time during lecture and exams.

**Privacy Act (FERPA):** The Family Educational Rights and Privacy Act (FERPA) prohibit the public posting of grades by social security number or in any manner personally identifiable to the individual student. No grades can be given by email or over the telephone, as positive identification cannot be made by this manner.

**Disruptive behavior:** No disruptive behavior of any kind will be tolerated in this course. Students should restrict talking and discussion to pertinent questions related to course material and these questions should be directed toward the instructor. Entering a classroom late or leaving early are discouraged. Any student disrupting lectures will be required to leave the classroom. Use of cellular telephones, pagers, or any similar remote communication device is prohibited during scheduled lectures or examinations. If students bring cellular telephones or similar devices to lecture, it is their responsibility to switch them off prior to the beginning of the lecture period.

**Students with Disabilities:** Students requesting classroom accommodations or modifications because of a documented disability must contact the Access Office for Students with Disabilities located in room 1115 Nevins Hall. The phone number is (229) 245-2498.

**Cheating:** Students caught cheating will receive a grade of “F” for the assignment in question and will be reported to the Dean of Students.

**Tentative Schedule:**

<b>Date</b>	<b>Lecture Topics</b>
8/15 (M)	Introduction; History of Aquatic Toxicology; Aquatic Environment
8/17 (W)	Levels of biological organization; Dose Response <b>Lab 1:</b> Using Pipettors; Accuracy and Precision, Making Solutions
8/19 (F)	Toxicity Testing <b>Lab 2:</b> Making Testing Waters
8/22 (M)	Classes of toxicants; Physical contaminants <b>Lab 3:</b> Water quality measurements
8/24 (W)	Nutrients and Biological Contaminants
8/26 (F)	PAHs Autoclave: water, Erlenmeyer flasks, and nutrient media for next week’s lab
8/29 (M)	PCBs <b>Lab 4:</b> Toxicity Test with <i>Selenastrum capricornutum</i>
8/31 (W)	Pesticides
9/2 (F)	Pesticides
<b>9/5 (M)</b>	<b>LABOR DAY HOLIDAY</b>
9/7 (W)	Estrogenic compounds <b>Lab 5:</b> Standard Preparation for Atomic Absorption spectrophotometer
9/9 (F)	<b>Lab 5:</b> Using Atomic Absorption spectrophotometer
9/12 (M)	<i>Journal Article 1; Journal Article 2</i> <b>Lab 6:</b> Toxicity Test with <i>Daphnia magna</i>
9/14 (W)	Review for Exam 1
<b>9/16 (F)</b>	<b>EXAM 1</b>
9/19 (M)	Metal fate and transfer (accumulation/homeostasis) <b>Lab 7:</b> Toxicity Test with <i>Pimephales promelas</i>
9/21 (W)	Aqueous metal toxicity
9/23 (F)	Aqueous metal toxicity
9/26 (M)	Dietary metal toxicity <b>Lab 8:</b> Toxicity Test with <i>Ceriodaphnia dubia</i>
9/28 (W)	Dietary metal toxicity
9/30 (F)	Dietary metal toxicity
10/3 (M)	Everglades <b>Lab 9:</b> TBA
10/5 (W)	Everglades Cont.; Nanoparticles
10/7 (F)	Physiological, biochemical and behavioral endpoints
10/10 (M)	Biomarkers <b>Lab 10:</b> TBA
10/12 (W)	<i>Journal Articles 3 and 4</i>
<b>10/14 (F)</b>	<b>EXAM 2</b>
10/17 (M)	Species specific differences <b>Lab 11:</b> TBA
10/19 (W)	Environmental regulations
10/21 (F)	Risk Assessment
<b>10/24 (M)</b>	<b>FALL BREAK</b>

10/26 (W)	<i>Journal Articles 5 and 6</i>
10/28 (F)	<b>Class Presentations-</b> Grad students
10/31 (M)	<b>Class Presentations-</b> Grad students; <b>Papers Due</b> <b>Lab 12:</b> TBA
11/2 (W)	<b>Class Presentations</b>
11/4 (F)	<b>Class Presentations</b>
11/7 (M)	<b>Class Presentations</b>
11/9 (W)	<b>Class Presentations</b>
11/11 (F)	<b>Class Presentations</b>
11/14 (M)	NO CLASS
<b>11/16 (W)</b>	<b>EXAM 3</b>
11/18 (F)	Case Study- Red Dog Mine
11/21 (M)	Case Study- Red Dog Mine
<b>11/23 (W)</b>	<b>THANKSGIVING HOLIDAY</b>
<b>11/25 (F)</b>	<b>THANKSGIVING HOLIDAY</b>
11/28 (M)	NO CLASS- Prepare for Case Study debate in groups
11/30 (W)	Case Study debate
12/2 (F)	TBA
12/5 (M)	Review for Final
<b>12/8 (R)</b>	<b>FINAL EXAM (8-10 am)</b>