

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

**Instructor:** Dr. Gretchen Bielmyer

Office: BC 1097

Office hours: Tuesday 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.

### **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:** (500 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			
Type	Points	Letter	Percentage
Exam 1	100	A	90-100%
Exam 2	100	B	80-89%
Exam 3	100	C	70-79%
Case Study	50	D	60-69%
Oral Presentation	50	F	≤ 59%
Journal Articles	60		
Participation	40		
Laboratory	150		
<b>Total</b>	<b>650</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. Three or more absences from laboratory will result in a 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.

**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:**

Date	Lecture Topics
1/8 (T)	Introduction; History of Aquatic Toxicology; Aquatic Environment
1/10 (TH)	Levels of biological organization; Dose Response; Toxicity Testing <b>Lab 1:</b> Using Pipettors; Accuracy and Precision, Making Solutions

1/15 (T)	Classes of toxicants; Physical contaminants <b>Lab 2:</b> Making Testing Waters
1/17 (TH)	Nutrients and Biological Contaminants <b>Lab 3:</b> Water quality measurements
1/22 (T)	PAHs; PCBs <b>Lab 3:</b> Water quality measurements;
1/24 (TH)	Pesticides <b>Lab:</b> Autoclave: water, Erlenmeyer flasks, and nutrient media for next week's lab
1/29 (T)	<i>Journal Article 1</i> ; <i>Journal Article 2</i> ; Review for Exam 1 <b>*Lab 4:</b> Toxicity Test with <i>Selenastrum capricornutum</i>
<b>1/31 (TH)</b>	<b>EXAM 1</b> <b>*Lab 4:</b> Toxicity Test with <i>Selenastrum capricornutum</i>
2/5 (T)	Estrogenic compounds; Metal Homeostasis <b>*Lab 4:</b> Toxicity Test with <i>Selenastrum capricornutum</i>
2/7 (TH)	Aqueous metal toxicity; <b>Two presentations (Graduate Students)</b> <b>Lab 5:</b> Standard Preparation for Atomic Absorption spectrophotometer
2/12 (T)	<i>Journal Article 3</i> ; Dietary metal toxicity ( <b>Graduate Student's papers due</b> ) <b>Lab 5:</b> Using Atomic Absorption spectrophotometer
2/14 (TH)	Dietary metal toxicity; <i>Journal Article 4</i> <b>*Lab 6:</b> Toxicity Test with <i>Daphnia magna</i>
2/19 (T)	Metal fate and transfer; <b>Three presentations</b> <b>*Lab 6:</b> Toxicity Test with <i>Daphnia magna</i>
2/21 (TH)	St. Johns River; <b>Three presentations</b> <b>*Lab 6:</b> Toxicity Test with <i>Daphnia magna</i>
2/26 (T)	St. Johns River; <b>Three presentations</b> <b>*Lab 7:</b> Using the BLM
<b>2/28 (TH)</b>	<b>Exam 2</b> <b>*Lab 7:</b> Using the BLM
3/5 (T)	Nanoparticles; <b>Two presentations</b> <b>*Lab 8:</b> Toxicity Test with <i>Ulva lactuca</i>
3/7 (TH)	<i>Journal Article 5</i> ; Physiological, biochemical and behavioral endpoints <b>*Lab 8:</b> Toxicity Test with <i>Ulva lactuca</i>
3/12 (T)	Species specific differences; Biomarkers <b>*Lab 8:</b> Toxicity Test with <i>Ulva lactuca</i>
3/14 (TH)	<i>Journal Article 6</i> ; Oceans and Pollution <b>*Lab 8:</b> Toxicity Test with <i>Ulva lactuca</i>
<b>3/19 (T)</b>	<b>Spring BREAK</b>
<b>3/21 (TH)</b>	<b>Spring BREAK</b>
3/26 (T)	Environmental regulations; <b>Two presentations</b> <b>*Lab 8:</b> Toxicity Test with <i>Ulva lactuca</i>
3/28 (TH)	Risk Assessment; <b>Two presentations; Lab:</b> Prepare for Field Trip
4/2 (T)	<b>EXAM 3</b>
4/4 (TH)	<b>*Lab 9: Field Trip; Meet at Lab at 9:00</b>
4/9 (T)	<b>*Lab 9: Compile Data and Analyses</b>
4/11 (TH)	Case Study- Red Dog Mine
4/16 (T)	Case Study- Red Dog Mine
4/18 (TH)	NO CLASS- Prepare for Case Study debate in groups; <b>Lab Notebooks Due!</b>
4/23 (T)	Case Study debate
4/25 (TH)	TBA

