

## **Limnology: Inland Water Ecosystems (EVSC 4290)**

Spring Semester 2024

**Monday-Wednesday-Friday 10:00 – 10:50**

**Instructor: Michael Pace**

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Office Hours: By appointment

**Course Description:** This course will focus on lakes, rivers, streams, and reservoirs as ecosystems. The goal of the course is to provide an understanding of the main physical, chemical, and biological processes that determine similarities and differences among inland waters. Major human impacts on inland waters will also be considered.

**Learning Objectives:** By the end of the course, you will be able to: 1) describe key physical, chemical, and biological processes in aquatic ecosystems, 2) analyze mass balance problems related to aquatic ecosystems, 3) understand the many impacts of humans on aquatic ecosystems, 4) analyze data that compare aquatic ecosystems and that identify trends, 5) appreciate the “services” provided by aquatic populations and ecosystems, 6) consider how aquatic ecosystems are changing at a local, regional, and planetary scales.

**Activities and Resources:** Daily class activities will vary. Most classes will have an associated Powerpoint presentation (“slide set” on Calendar below) that provides the topic material for the day. These presentations will be provided in advance to review in preparation for the class. The instructor will highlight aspects of these slides and allow time for questions and discussion. Class sessions will also include problems, worksheets, and short readings that we will do together. These activities are designed to help students understand and implement the concepts presented in class and will not be graded. Some class sessions will be devoted to discussion of assigned readings.

There is no textbook for this class. Assigned readings are available on Canvas. Additional short readings will be provided and done in class.

**Grading Scheme:** Course grades will be determined from your combined, weighted scores on a series of tests, assignments, and class participation as follows:

Tests: Three one-hour tests will be given to assess your learning. Each test will account for 20% of your final grade.

Course project: A series of four assignments will be given where you will access data, conduct analyses, and in some cases provide short written summaries. The components of this project are described separately and will constitute 25% of your final grade.

**Class participation:** Attendance and contributions in class will be considered and constitute 5% of your final grade.

**Leading discussion of reading:** We will form pairs. Each pair will select one of the assigned readings and lead the class discussion of that reading. Each team (pair) will briefly present an overview of the reading and then provide a set of questions for class discussion. The questions will be submitted after the class, and you will be evaluated on the quality of the discussion for 10% of your final grade.

Course grades are assigned based on your final scores on a 100 point scale: >97 = A+, 93-97 = A, 90-93 = A-, 87-90 = B+, 83-87 = B, 80-83 = B-, 77-80 = C+, 73-77 = C, 70-73 = C-, 60-70 = D, < 60 = F

**Attendance Policy:** Attending classes is required except for University sponsored trips or illness.

**Late Work Policy:** Keeping up with course material and assignments is critical. The class is designed to provide continuous graded assessments to help you keep up and to prevent too much grading emphasis on a single item. Please complete all tests and assignments by the deadlines indicated. If you have a special reason for needing additional time (e.g., illness) please discuss with me.

**Academic Integrity Policy:** As your instructor, I start from a position of trust with all in the class. I will carefully lay out guidelines and indicate what work is to be done individually and "pledged". Please be sure you understand the guidelines before engaging in assignments and tests. Do not hesitate to ask for clarification.

**Accessibility:** Materials will be made available on Canvas. If you have difficulties with accessing course materials, have special needs, or have technical issues, please notify me. I will work with you to accommodate needs and resolve technical problems.

**Calendar:** The color codes on the calendar are: green = break days, no class; yellow = test days; light blue = data assignment; orange = reading set designated for discussion (readings on Canvas).

Week	Topic	Date	Slide Set	Readings	Project
1	Course description, Introduction to aquatic ecosystems, Klamath Case Study 1	Wednesday Jan. 17	1a, 1b		
		Friday Jan. 19	1c		
2	Klamath Case Study 2	Monday Jan 22	1c continued	Set A	
	Physical processes: water budgets temperature, mixing, water movements, light	Wednesday Jan. 24	2a, 2b		
		Friday Jan. 26	2c		Data assignment 1 discussed
3	Water body origins and morpholog	Monday Jan. 29	3a		
		Wednesday Jan. 31	3b		
		Friday Feb. 1		Set B	
4	Aquatic chemistry 1: Oxygen, inorganic carbon, pH	Monday Feb. 5	4a		Data assignment 1 due
		Wednesday Feb. 7	4b		
		Friday Feb. 9	4c		Data assignment 2 discussed
5	Aquatic chemistry 2: salinity, cations, anions, trace metals, salinization	Monday Feb. 12	5a		
		Wednesday Feb. 14	5b		
<b>Test 1</b>		<b>Friday Feb. 16</b>			
6	Limiting nutrients phosphorus and nitrogen	Monday Feb. 19	6a		
		Wednesday Feb. 21	6b		
		Friday Feb. 23		Set C	Data assignment 2 due
7	Primary production: phytoplankton, attached algae, aquatic plants	Monday Feb. 26	7a		
		Wednesday February	7b		
		Friday March 1	No Class		
<b>8 No Class, Spring Break</b>		<b>March 4-8</b>			
9	Eutrophication, HABS	Monday March 11	9a		Data assignment 3 discussed
		Wednesday March 13	9b		
		Friday March 15		Set D	
10	Secondary production: zooplankton, benthos, microbes	Monday, March 18	10a		
		Wednesday March 21	10b		
		Friday March 22	10c		
11	Fish and Lake Victoria case study Complete Lake Victoria case	Monday March 25	11a		
		Wednesday March 27			
<b>Test 2</b>		<b>Friday March 29</b>			
12	Aquatic food chains and food webs: Aquatic ecosystem dynamics	Monday April 1	12a		
		Wednesday April 3	12b		
		Friday April 5		Set E	Data assignment 3 due
13	Sediments, sedimentation, paleolimnology, contaminants	Monday April 8	13a		
		Wednesday April 10	13b		
		Friday April 12		Set F	Data assignment 4 discussed
14	Conservation and protection of aquatic ecosystems, exotic species, endangered species	Monday April 15	14a		
		Wednesday April 17	14b		
		Friday April 19		Set G	
15	Reservoirs, ecosystem services, climate change and aquatic ecosystems	Monday April 22	15a		Data assignment 4 due
		Wednesday April 24	15b		
		Friday April 26	15c		
<b>16 Test 3</b>		<b>Monday April 29</b>			

## **Limnology (EVSC 4290) Data Project Spring 2024**

Each student will acquire data to analyze related to a limnological issue. The project will be done in four assignments. In assignment 1 you will be given two sets of data and asked to analyze these using linear regression. In assignment 2 you will report on a topic, data set you intend to use, question, and approach. In assignment 3 you will report results of your analysis including graphs, statistical metrics, and a brief summary. In assignment 4 you will synthesize your results with a two-page paper that summarizes a key graph from the 3<sup>rd</sup> assignment.

Analyses for assignments 2-4 can either be: 1) predictive relationships where you use the data to test the degree to which variable B can be predicted from variable A; 2) trends over time where you use data to test for a trend of variable A versus time.

### **Topic Identification and Data**

Each student will develop a topic to complete assignments 2-4. A key feature will be to identify a question for which data can be gathered and analyzed. Data sets will be posted for you to choose from to do your analyses.

### **Assignment Description and Deadlines**

Each assignment will be described more fully in a class session. Review and download assignment materials, complete the assignment and post your answers prior to the deadline. Deadlines are on the syllabus calendar.

### **Grading**

The project will constitute 25% of your final grade cumulative for the 4 assignments as follows:

- Assignment 1 (15 points)
- Assignment 2 (15 points)
- Assignment 3 (30 points)
- Assignment 4 (40 points)