EVPP 550 - Waterscape Ecology and Management
Fall 2022 (Tuesday 4:30-7:10)
Syllabus

Course Description and Goals: This course examines the physical, chemical, and biological processes occurring in lakes, streams, and other inland water bodies and, thus is similar to a traditional "limnology" or "freshwater ecology" class. The name "waterscape ecology" has been chosen to emphasize the linkages among inland water bodies within any region and between water-bodies and the surrounding landscape. Landscape is defined as "the landforms of a region in aggregate" (Webster's Ninth New Collegiate Dictionary) and by extension a waterscape could be defined as "the water-bodies of a region in aggregate".

This course assumes a basic knowledge of ecology and chemistry. Students will learn the requisite hydrology and fluvial geomorphology to understand the physical structure of streams and how that in turn influences the water chemistry and ecology of streams. Factors affecting the physical structure of lakes will be related to lake chemistry and ecology. Management of freshwater systems will be discussed in light of the preceding information on lake and stream ecology. Our examination of this material will include lectures, optional textbook readings, journal readings, and problem sets. *Tests will focus on lecture material and journal article readings.* After completion of the course students will be competent to critically evaluate data on freshwater systems and to understand the relationship between physics, chemistry, and ecology in freshwater systems. This course provides the basis for EVPP 645: Freshwater Ecology and for research in freshwater ecology.

Course Content and Instructional Methods: The subject matter of this course is delivered in the form of lectures, lecture outlines, and assigned readings.

Date	**Topic**	**Text Reading**
Aug 23 (Lec 1)	Introduction to the Waterscape, Properties of Water, Origins of Lakes, Lake Morphometry	LH1: Ch. 1,2,3,5
Aug 30 (Lec 2)	Light, heat, and physical structure of lakes, temp, oxygen Physico-chemistry of Lakes: carb.-bicarb. equil., pH, alk, hrdn	LH1: Ch. 5,6,4
Sept 6 (Lec 3)	Lake Chemistry: P, Fe, Mn, Si. Overview of Lake Food Webs, Phytoplankton	LH1: Ch. 4 LH1: Ch. 10
Sept 13 (Lec 4)	Zooplankton; Benthic and Littoral Food Webs Role of Fish in Lake Ecology *Journal Article Presentation*	LH1: Ch. 14,11,12, 15,16,
Sept 20	1st EXAM	
Sept 27	Field Trip to the Potomac Science Center (details to be discussed) *PROBLEM SET DISTRIBUTED*	

Oct 4 (Lec 5)	Watersheds, Hydrology, Fluvial Geomorphology, Stream Physical Structure *PROBLEM SET ON FIELD TRIP DATA DUE*	RH1: Ch. 1,2,3
Oct 11	NO CLASS. Fall Break for Tuesday classes	
Oct 18 (Lec 6)	Physico-chemistry of Streams: DO, pH, TSS, N, P, spiraling *TERM PAPER PROPOSAL DUE (see requirements below)*	RH1: Ch. 4,18
Oct 25 (Lec 7)	Stream food webs: detritus, algae, macrophytes, invertebrates River Continuum Concept	RH1:Ch. 8-11,14-17
Nov 1 (Lec 8)	Linkage between streams, their watersheds, and their floodplain Role of Fish in Stream Food Webs *Journal Article Presentation*	RH1:12
Nov 8	2nd Exam through Stream Ecology	
Nov 15 (Lec 9)	Mgmt of Freshwater Ecosystems: Clean water act, Eutrophication, Biomanipulation, TMDL's, Bioassessment *Journal Article Presentation*	LH2:14,16,17,10 RH2:2
Nov 22 (Lec 10)	Mgmt of FW Ecosystems: Bioassessment, Stormwater, Acidification, Contaminants, Micropollutants, Road Salt *Journal Article Presentation*	LH2:18 RH2:8
Nov 29 (Lec 11)	Mgmt of Freshwater Ecosystems: Case Studies *TERM PAPERS FINAL DEADLINE*	LH2:7,4,3

3rd Exam: Dec. 13, 4:30-7:10 in regular classroom. Covers Material since 2nd Exam.

Textbooks:

LH1: The Lakes Handbook. O'Sullivan, P.E. and C.S. Reynolds. 2004. The Lakes Handbook. Volume 1. Limnology and Limnetic Ecology. Blackwell Scientific Publishers. 699 pp. Available online:
https://onlinelibrary-wiley-com.mutex.gmu.edu/doi/book/10.1002/9780470999271

LH2: The Lakes Handbook. O'Sullivan, P.E. and C.S. Reynolds. 2004. The Lakes Handbook. Volume 2. Lake Restoration and Rehabilitation. Blackwell Scientific Publishers. 560 pp. Available online:
https://onlinelibrary-wiley-com.mutex.gmu.edu/doi/book/10.1002/9780470750506

RH1: Calow, P. and G.F. Petts. 1992. The Rivers Handbook. Hydrological and Ecological Principles. Volume 1. Blackwell Scientific Publishers. Oxford. 526 pp.

-will be on reserve at Fenwick Library in Fairfax

RH2: Calow, P. and G.F. Petts 1994. The Rivers Handbook. Hydrological and Ecological Principles. Volume 2. Blackwell Scientific Publishers. Oxford. 523 pp.
-available online: https://onlinelibrary-wiley-com.mutex.gmu.edu/doi/book/10.1002/9781444313871

Additional suggested readings will be provided on lecture outlines

Methods of Evaluation:

Grading:	1st Exam	80 pts
	2nd Exam	80 pts
	Final Exam	80 pts
	Problem set based on field trip	20 pts
	Journal Article Presentation	40 pts
	Literature-based Term Paper	100 pts
	TOTAL	400 pts

1st exam, 2nd exam, and Final exam are in-class closed book.

Course consists of three segments: Segment 1: Lake Ecology (Lectures 1-4); Segment 2: Stream Ecology (Lectures 5-8); and Segment 3: Management of Freshwater Ecosystems (Lectures 9-12). Each segment will culminate in an exam.

Each student is required to **present a journal article in each course segment** assigned by the professor to the class. Sign up sheet will be distributed on the first day of class. Guidelines will be forthcoming as a separate document.

Students must write **a literature based research paper.** Students must submit a 1 page written proposal to the instructor by the date given above. The topics must be within the scope of the course – limnology, stream ecology, freshwater ecology – and can focus on theoretical or applied topics. Proposals for literature-based papers should include title, outline of paper and at least 5 citations of **Journal Articles** to be used in the paper. The proposal will be reviewed and returned to the student within 1 week.

The **final literature based paper** will be at least 20 pages (double-spaced) **utilizing** at least 20 references of which 10 must be **journal articles**. Term papers received by November 27 will receive a 5 pt early submission bonus. All papers are due on the final day of class (December 5).

Mason has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person

credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using parenthetical citation.

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Office Hours (Fall 2022): Tues 2:00-4:00 pm in David King Hall (please email if you are coming)

Revised: March 1, 2022