

EVPP 550 - Waterscape Ecology and Management
Fall 2020 (Thursday 3:30-6:20)
3102 Potomac Science Center, 650 Mason Ferry Avenue, Woodbridge, VA 22191
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 27 (Lec 1)	Introduction to the Waterscape, Properties of Water, Origins of Lakes, Lake Morphometry	W: Chap. 1,2,3,4
Sept 3 (Lec 2)	Light, heat, and physical structure of lakes, temp, oxygen Physico-chemistry of Lakes: carb.-bicarb. equil., pH, alk, hrdn	W: Ch. 5,6,7,9,11
Sept 10 (Lec 3)	Lake Chemistry: P, Fe, Mn, Si. Overview of Lake Food Webs, Phytoplankton	W: Ch. 12,13,14 W: Ch. 15
Sept 17 (Lec 4)	Zooplankton; Benthic and Littoral Food Webs Role of Fish in Lake Ecology <i>Journal Article Presentation</i>	W: Ch. 16,18,19,22
Sept 24	1 st EXAM	
Oct 1	Field Trip to the Potomac Science Center (details to be discussed)	

PROBLEM SET DISTRIBUTED

- Oct 8 Watersheds, Hydrology, Fluvial Geomorphology, Stream Physical Structure RH: Ch. 1,2,3
(Lec 5) *PROBLEM SET ON FIELD TRIP DATA DUE*
- Oct 15 Physico-chem of Streams: DO, pH, TSS, N, P, spiraling RH: Ch. 4,18
(Lec 6) *TERM PAPER PROPOSAL DUE (see requirements below)*
- Oct 22 Stream food webs: detritus, algae, macrophytes, invertebrates RH: Ch. 8-11,14-17
(Lec 7) River Continuum Concept
- Oct 29 Linkage between streams, their watersheds, and their floodplain RH: 12
(Lec 8) Role of Fish in Stream Food Webs
Journal Article Presentation
- Nov 5 2nd Exam through Stream Ecology
- Nov 12 Mgmt of Freshwater Ecosystems: Clean water act, Eutrophication, TMDL's, Bioassessment
(Lec 9) *Journal Article Presentation*
- Nov 19 Mgmt of FW Ecosystems: Stormwater, Acidification, Contaminants, Micropollutants
(Lec 10) *Journal Article Presentation*
- Nov 26 THANKSGIVING BREAK (NO CLASS)
- Dec 3 Mgmt of Freshwater Ecosystems: Wrap Up: road salts
(Lec 11) *TERM PAPERS FINAL DEADLINE*

3rd Exam: Dec. 12, 3:30-6:30 in regular classroom. Covers Material since 2nd Exam.

Textbooks:

W: Wetzel, R.G. 2001. Limnology: Lake and River Ecosystems. Academic Press. 3rd Ed. 1006 pp.

-available in the bookstore or as a used book on line

RH: 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 and at PEREC library at Potomac Science Center

Additional suggested readings will be provided on lecture outlines

Methods of Evaluation:

Grading:	1st Exam	80 pts
	2 nd Exam	80 pts
	3rd 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 3rd 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 3).

Instructor: R. Christian Jones
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 Director, Potomac Environmental Research and Education Center

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Center Web Page: <http://perec.gmu.edu>

Office Hours (Fall 2020): Thur 130-330 at 3018 Potomac Science Center (please email ahead if you are coming)

Revised: May 15, 2020