EVPP 550 - Waterscape Ecology and Management
Fall 2024 (Tuesday 3:30-6:10; 3102 Potomac Science Center)
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.
In the table below, primary readings for each lecture are shown in bold.

Date	Topic	Text Reading
Aug 28 (Lec 1)	Introduction to the Waterscape, Properties of Water, Origins of Lakes, Lake Morphometry *Problem set distributed*	LH1: Ch. 1,2,3,5 **Wetzel: Ch. 2,3,4,10**
Sept 4 (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 **Wetzel: Ch. 6,7,12,13**
Sept 11 (Lec 3)	Lake Chemistry: P, Fe, Mn, Si. Overview of Lake Food Webs, *Problem set due*	LH1: Ch. 4,9 **Wetzel: Ch. 14,15,16**
Sept 18 (Lec 4)	Phytoplankton and Attached Algae *Journal Article Presentation: Group 1*	LH1: Ch. 10,14 **Wetzel: Ch 17,18,25**
Sept 25	1st EXAM (through Lecture 4)	
Oct 2 (Lec 5)	Zooplankton and Benthic Invertebrates in Lakes	LH1: 11, 12, 15,16 **Wetzel: Ch. 19,20,21**

Oct 9 (Lec 6)	Aquatic Macrophytes (SAV) and Fish in Lakes Lakes as Ecosystems: Energy Flow and Regulation *Journal Article Presentation (group 2)*	**Wetzel: Ch. 22,24,26**
Oct 16 (Lec 7)	Watersheds, Hydrology, Fluvial Geomorphology, Stream Physical Structure *TERM PAPER PROPOSAL DUE (see requirements below)*	**RH1: Ch. 1,2,3** Wetzel: Ch. 4,5
Oct 23	Exam 2	
Oct 23 (Lec 8)	Physico-chemistry of Streams: DO, pH, TSS, N, P, spiraling	**RH1: Ch. 4,18** Wetzel: Ch 11,13,14,15
Oct 30 (Lec 9)	Stream food webs: detritus, algae, macrophytes, invertebrates River Continuum Concept	**RH1:Ch. 8-11,14-17** Wetzel: Ch 17,21
Nov 6	2nd Exam through Lecture 8	
Nov 13 (Lec 10)	Mgmt of Freshwater Ecosystems: Clean water act, Eutrophication, Biomanipulation, TMDL's, Bioassessment	**LH2:14,16,17,10** RH2:2
Nov 20 (Lec 11)	Mgmt of FW Ecosystems: Bioassessment, Stormwater, Acidification, Contaminants, Micropollutants, Road Salt *Journal Article Presentation (Group 3)*	**LH2:18** RH2:8
Nov 27	Thanksgiving Break: No class	
Dec 4 (Lec 12)	Mgmt of Freshwater Ecosystems: Case Studies *TERM PAPER DEADLINE for extra credit*	**LH2:7,4,3**
Dec 10	*TERM PAPER DEADLINE*	

Final Exam: Dec. 11, 3:30-6:10 in regular classroom. Covers ONLY Material since 2nd Exam.

Textbooks:

Wetzel's Limnology: Lake and River Ecosystems. I.D. Jones and J.P. Smol (eds). 2024. Academic Press. Hardcopy available at the GMU bookstore. Ebook available directly from the publisher.

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	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 1-6); Segment 2: Stream Ecology (Lectures 7-9); and Segment 3: Management of Freshwater Ecosystems (Lectures 10-12).

Each student is required to **present a journal article** assigned by the professor to the class. There will be 3 sessions with 2-3 students each session. Sessions correspond to the segments given above. Sign up sheet will be distributed on the first day of class. Guidelines will be forthcoming as a separate document.

A **Problem Set** will be assigned on the first day of classes which will help illustrate some of the concepts in the lake ecology section. See syllabus for details on due date and points toward final grade.

Students must write **a literature-based term 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 promptly.

The **final literature based term 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 December 4 will receive a 5 pt early submission bonus. Final deadline to submit the research paper is December 10. A student not

submitting the term paper by that date will receive an Incomplete (I) grade in the class.

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 and any published materials, 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 or close paraphrasing from another person or publication 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.

Instructor: R. Christian Jones
Professor, Environmental Science and Policy
Director, Potomac Environmental Research and Education Center
Potomac Science Center
650 Mason Ferry Avenue
Woodbridge, VA 22191

Email (*preferred method of contact*): **rcjones@gmu.edu**
Center Web Page: http://perec.gmu.edu
Office Hours (Fall 2024): Wed 2:00-3:15 pm in my office 3114 Potomac Science Center (please email if you are coming) or by appointment.

Common Course-Related Policies at GMU

Academic Standards

Academic Standards exist to promote authentic scholarship, support the institution's goal of maintaining high standards of academic excellence, and encourage continued ethical behavior of faculty and students to cultivate an educational community which values integrity and produces graduates who carry this commitment forward into professional practice.

As members of the George Mason University community, we are committed to fostering an environment of trust, respect, and scholarly excellence. Our academic standards are the foundation of this commitment, guiding our behavior and interactions within this academic community. The practices for implementing these standards adapt to modern practices, disciplinary contexts, and technological advancements. Our standards are embodied in our courses, policies, and scholarship, and are upheld in the following principles:

- ***Honesty:*** *Providing accurate information in all academic endeavors, including communications, assignments, and examinations.*
- ***Acknowledgement:*** *Giving proper credit for all contributions to one's work. This involves the use of accurate citations and references for any ideas, words, or materials created by others in the style appropriate to the discipline. It also includes acknowledging shared authorship in group projects, co-authored pieces, and project reports.*

- ***Uniqueness of Work:*** *Ensuring that all submitted work is the result of one's own effort and is original, including free from self-plagiarism. This principle extends to written assignments, code, presentations, exams, and all other forms of academic work.*

Violations of these standards—including but not limited to plagiarism, fabrication, and cheating—are taken seriously and will be addressed in accordance with university policies. The process for reporting, investigating, and adjudicating violations is outlined in the university's procedures. Consequences of violations may include academic sanctions, disciplinary actions, and other measures necessary to uphold the integrity of our academic community.

The principles outlined in these academic standards reflect our collective commitment to upholding the highest standards of honesty, acknowledgement, and uniqueness of work. By adhering to these principles, we ensure the continued excellence and integrity of George Mason University's academic community.

Student responsibility: *Students are responsible for understanding how these general expectations regarding academic standards apply to each course, assignment, or exam they participate in; students should ask their instructor for clarification on any aspect that is not clear to them.*

Accommodations for Students with Disabilities

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit https://ds.gmu.edu/ for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu. Phone: (703) 993-2474.

Student responsibility*: Students are responsible for registering with Disability Services and communicating about their approved accommodations with their instructor in advance of any relevant class meeting, assignment, or exam.*

FERPA and Use of GMU Email Addresses for Course Communication

*The **Family Educational Rights and Privacy Act (FERPA)** governs the disclosure of education records for eligible students and is an essential aspect of any course. **Students must use their GMU email account** to receive important University information, including communications related to this class. Instructors will not respond to messages sent from or send messages regarding course content to a non-GMU email address.*

Student responsibility*: Students are responsible for checking their GMU email regularly for course-related information, and/or ensuring that GMU email messages are forwarded to an account they do check.*

Title IX Resources and Required Reporting

As a part of George Mason University's commitment to providing a safe and non-discriminatory learning, living, and working environment for all members of the University community, the University

does not discriminate on the basis of sex or gender in any of its education or employment programs and activities. Accordingly, ***all non-confidential employees, including your faculty member, have a legal requirement to report to the Title IX Coordinator, all relevant details obtained directly or indirectly about any incident of Prohibited Conduct*** *(such as sexual harassment, sexual assault, gender-based stalking, dating/domestic violence). Upon notifying the Title IX Coordinator of possible Prohibited Conduct, the Title IX Coordinator will assess the report and determine if outreach is required. If outreach is required, the individual the report is about (the "Complainant") will receive a communication, likely in the form of an email, offering that person the option to meet with a representative of the Title IX office.*

For more information about non-confidential employees, resources, and Prohibited Conduct, please see ***University Policy 1202****: Sexual and Gender-Based Misconduct and Other Forms of Interpersonal Violence. Questions regarding Title IX can be directed to the Title IX Coordinator via email to TitleIX@gmu.edu, by phone at 703-993-8730, or in person on the Fairfax campus in Aquia 373.*

Student opportunity: *If you prefer to speak to someone* ***confidentially****, please contact one of Mason's confidential employees in Student Support and Advocacy (SSAC), Counseling and Psychological Services (CAPS), Student Health Services (SHS), and/or the* ***Office of the University Ombudsperson****.*

Student Support Resources on Campus

The Stearns Center for Teaching and Learning offers great resources supporting student success, such as

- Student Support and Advocacy Center (SSAC)
- Counseling and Psychological Services
- The Learning Services Office or field-specific tutoring
- The Center for Culture, Equity, and Empowerment
- LBGTQ+ Resources
- University Career Services
- University Writing Center

For full list visit https://stearnscenter.gmu.edu/knowledge-center/knowing-mason-students/student-support-resources-on-campus/ and https://wellbeing.gmu.edu/students/.

Revised: August 27, 2024