



ECOHYDROLOGY
FNR 6564 (3 credits)
Fall 2023

GENERAL COURSE OVERVIEW

Overview: This course introduces ecohydrology – the study of interactions between organisms, ecosystems and the hydrologic cycle - using a blend of theory and case studies.

Student Learning Outcomes: Students in this course will be exposed to the complex interactions between water and ecosystems via targeted examples drawn from a variety of model systems and processes. There are 5 core objectives to be met by the end of this course:

- 1) Students will be able to synthesize recent literature in a broad topic area
- 2) Students will have demonstrated competence in the design and implementation of a novel ecohydrologic analysis
- 3) Student will develop presentation skills leading class discussion on selected topics.
- 4) Students will demonstrate written skills via submission of extended term papers and group project reports, and evaluation of other students' submissions.
- 5) Students will be demonstrate critical thinking as it pertains to the complex interactions between organisms and the water cycle.

PREREQUISITES

Introductory courses in water resources **and** ecology **or** instructor permission

HOURS AND LOCATION

Class Time:

Tuesday 1:55-2:45

Thursday 1:55-3:50

Location:

McCarty B 1108

McCarty B 1108

INSTRUCTOR

Matthew Cohen (Professor)

328 Newins-Ziegler Hall

Canvas Website

Office Hours (by appt)

mjc@ufl.edu

(352) 846-3490

<https://ufl.instructure.com/courses/479682>

Tuesdays 12:00 – 1:45 pm

REQUIRED READINGS

This course leans **heavily** on the primary literature. Some or all of the readings below will be assigned by the instructor in addition to relevant papers to be assigned on each topic area.

- **Primary Text 1:** *Hydroecology and Ecohydrology: Past, Present and Future*. 2007. P.J. Wood, D.M. Hannah and J.P. Sadler (eds.)
- **Primary Text 2:** *Ecohydrology: Dynamics of Life and Water in the Critical Zone*. 2022. Porporato, A. and J. Yin Cambridge University Press

- Belyea, L.R. and A.J. Baird 2006. Beyond “The Limits to Peat Bog Growth”: Cross-scale feedback in peatland development. *Ecological Monographs* 76:299-322
- Corenblit, D., A.M. Gurnell, J. Steiger and E. Tabacchi. 2008. Reciprocal adjustments between landforms and living organisms: Extended geomorphic evolutionary insights. *Catena* 73:261-273
- Dietrich, W.E. and J.T. Perron. 2006. The search for a topographic signature of life. *Nature* 439:411-418
- Eppinga, M.B., M. Rietkerk, W. Borren, E.D. Lapshina, W. Bleuten and M.J. Wassen. 2008. Regular Surface Patterning of Peatlands: Confronting Theory with Field Data. *Ecosystems* 11:520-536
- Fisher, S.G., J.B. Heffernan, R.A. Sponseller and J.R. Welter. 2007. Functional ecomorphology: Feedbacks between form and function in fluvial landscape ecosystems. *Geomorphology* 89:84-96
- Hatton, T.J., G.D. Salvucci and H.I. Wu. 1997. Eagleson’s Optimality Theory of Ecohydrological Equilibrium: Quo Vadis? *Functional Ecology* 11:665-674
- Huxman, T.E., B.P. Wilcox, D.D. Breshears, R.L. Scott, K.A. Snyder, E.E. Small, K. Hultine, W.T. Pockman and R.B. Jackson. 2005. Ecohydrological Implications of Woody Plant Encroachment. *Ecology* 86:308-319
- McCarthy, T.S., W.N. Ellery and I.G. Stanistreet. 1992. Avulsion mechanisms on the Okavango fan, Botswana: the control of a fluvial system by vegetation. *Sedimentology* 39:779-795
- McKenney, R., R.B. Jackson and R.C. Wertheimer. 1995. Woody vegetation and channel morphogenesis in low-gradient gravel-bed streams in the Ozark Plateaus, Missouri and Arkansas. *Geomorphology* 13:175-198
- Newman, B.D. et al. 2006. Ecohydrology of water limited environments: A scientific vision. *Water Resources Research* 42
- Rodriguez-Iturbe, I., P. D’Odorico, F. Laio, L. Ridolfi, and S. Tamea. 2007. Challenges in humid land ecohydrology: Interactions of water table and unsaturated zone with climate, soil, and vegetation. *Water Resources Research* 43
- Rodriguez-Iturbe, I. 2000. Ecohydrology: A hydrologic perspective of climate-soil-vegetation dynamics. *Water Resources Research* 36:3-9
- Scanlon, T.M. K.K. Caylor, S.A. Levin and I. Rodriguez-Iturbe. 2007. Positive feedbacks promote power law clustering of Kalahari vegetation. *Nature* 449:209-213
- Stallins, J.A. 2006. Geomorphology and ecology: Unifying themes for complex system in biogeomorphology. *Geomorphology* 77:207-216
- Van Hulzen, J.B., J. van Soelen and T.J. Bouma. 2007. Morphological Variation and Habitat Modification are Strongly Correlated for the Autogenic Ecosystem Engineer *Spartina anglica* (common cordgrass). *Estuaries and Coasts* 30:3-11
- Wilcox, B.P., D.D. Breshears and C.D. Allen. 2003. Ecohydrology of a resource-conserving semi-arid woodland: effects of scale and disturbance. *Ecological Monographs* 73:223-239
- Zalewski, M. 2002. Ecohydrology – the use of ecological and hydrological processes for sustainable management of water resources. *Hydrological Sciences* 47:823-831.



PERFORMANCE EVALUATION

Grading Scale:

A	= 100-90%	C	= 75-70%
B+	= 89-86%	D+	= 69-66%
B	= 85-80%	D	= 65-60%
C+	= 79-76%	E	<60%

Additional information on grade policies at the University of Florida can be found at <http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>.

Assignments

Discussion Lead and Participation	25%
Synthesis paper	35%
Group synthesis development, implementation and manuscript	40%

Notes:

- Class attendance is required.
- Synthesis papers are due **October 5th**.
- Group papers. Groups of students (n=2-3) will use “found” data to test a hypothesis of their choosing; students will be responsible for identifying and executing the work under the guidance of the instructor and write up results in a journal article format. Grades will be based on instructor (75%) and peer (25%) review. Final manuscripts are due **Dec. 5th**.

DISCUSSION LEAD

- Working with the instructor, identify two papers of interest to you from the list provided at the beginning of the semester, or from your “to-read” list.
- Everyone reads each paper
- Each student will lead a discussion (objectives, methods, findings, limitations, implications)
- Participation is 10% of the total grade

SYNTHESIS PAPER

- Start early(!) A 1–2-page topic area summary of your chosen topic is due to the instructor by **September 7th**; include 5-10 relevant papers as part of this summary. Focus on topic areas that occupy the overlap between your own research and the central concepts of this course.
- Papers are expected to be ~15 pages long. They are due **Oct. 5th**.

GROUP SYNTHESIS AND MANUSCRIPT

- Start early(!) Draft questions, hypotheses and predictions are due **October 19th**. What is your question? What data are necessary to address this question, and where are these data from? How many data are necessary, and how long will the analysis take? In addition to “interestingness”, consider the tractability of your question.
- Draft manuscript due **Nov. 28th**. Peer review will occur on the draft manuscript. Final manuscript due **Dec. 5th**.
- Present findings at the end of class (20 minutes + 5 for questions).



ECOHYDROLOGY COURSE SCHEDULE (FALL 2021)

Week of...	Tuesday (1 hour)	Thursday (2 hrs)	Due Dates
Aug. 21 st	NO CLASS	Course Structure, Expectations <i>Why Ecohydrology?</i>	
Aug. 28 th	Primer on Systems Thinking	Ecohydrological equilibria and Eagleson's Hypothesis	
Sep. 4 th	Soil Moisture - Control in Water Limited Ecosystems	Arid land ecohydrology	SYNTHESIS PAPER TOPIC DUE SEPT. 7th
Sep. 11 th	Arid land ecohydrology	Ecohydrology of Streamflow	
Sep. 18 th	Ecohydrology of Streamflow	Ecological Effects on Sediment Stabilization	
Sep. 25 th	Humid land ecohydrology	Ecohydrology of the Okavango - Channel avulsion	
Oct. 2 nd	Humid land ecohydrology	Shallow water table ecohydrology	SYNTHESIS PAPER DUE OCT. 5th
Oct. 9 th	Wetland Ecohydrology	Wetlandscapes	
Oct. 16 th	Patterned peatlands	Patterned peatlands	GROUP PROJECT PROPOSAL DUE OCT. 19th
Oct. 23 rd	Karst ecohydrology	Karst ecohydrology	
Oct. 30 th	Biogeomorphology	Stream nutrient spiraling	
Nov. 6 th	NO CLASS	Ecohydraulics and element cycles	
Nov. 13 th	Nutrient Spiraling and Eutrophication	Hydrobiological controls on P in the Everglades	
Nov. 20 th	NO CLASS THANKSGIVING	NO CLASS THANKSGIVING	
Nov. 27 th	Ecohydrology and restoration	Ecohydrology and restoration	DRAFT GROUP PAPER DUE NOV. 28th
Dec. 4 th	CLASS PRESENTATIONS	NO CLASS	FINAL GROUP PAPER DUE DEC. 5th



ADDITIONAL INFORMATION

Academic Honesty: The University of Florida requires members of its community to be honest in all endeavors. Cheating, plagiarism, and other acts diminish the process of learning. When students enroll at UF they commit themselves to honesty and integrity. I fully expect you to adhere to the academic honesty guidelines you signed when you were admitted to UF. As a result of completing the registration form at the University of Florida, every student has signed the following statement: “I understand the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.” Furthermore, on work submitted for credit by UF students, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” It is to be assumed all work will be completed independently unless the assignment is defined as group project, in writing by the professor. This policy will be vigorously upheld at all times in this course.

Software Use: All faculty, staff, and students of UF are required and expected to obey laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Disciplinary action will be taken as appropriate.

Campus Helping Resources: Students experiencing crisis or personal problems that interfere with their general wellbeing are encouraged to utilize UF counseling resources. Both the Counseling Center and Student Mental Health provide confidential counseling services at no cost for enrolled students. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health is located on the second floor of the Student Health Services in the Infirmary.

1. *University Counseling Center*, 301 Peabody Hall, 392-1575; personal and career counseling: www.counsel.ufl.edu
2. *Student Mental Health*, Student Health Care Center, 392-1171, personal counseling: www.hsc.ufl.edu/shcc/smhs.htm
3. *Sexual Assault Recovery Services (SARS)*, Student Health Care Center, 392-1161, sexual assault counseling; and
4. *Career Resource Center*, Reitz Union, 392-1601, career assistance and counseling.

Students with Disabilities Act: The Dean of Students Office coordinates the accommodations of students with disabilities. This includes the registration of disabilities, academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services, and mediating faulty-student disability related issues. *Dean of Students Office*, 202 Peabody Hall, 392-7066, www.dso.ufl.edu.

HB 233 (Intellectual and Viewpoint Diversity Act): To comply with HB 233 students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are *strictly controlled*. The only allowable purposes are (1) personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a



particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor *is prohibited*. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student in the same class. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or 3rd-party note/tutoring services. A student who publishes a recording without written consent may be subject to civil cause of action instituted by those injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.