IDS 2935: Water for People and Nature

Quest 2

I. Course Information

Spring 2025 Lectures: Mon. 10:40-11:30 am, Wed. 10:40-11:30 am, Williamson Hall 0100 Small Group Sessions: <u>Susannah Lohmann</u>

Fri. 9:35-10:25am, Antevy Hall 0213 Fri. 10:40-11:30am, McCarty B G108 Fri. 11:45-12:35pm, Computer Sciences/Engineering E222 Samantha Howley Fri. 12:50-1:40pm, Rinker Hall 0220 Fri. 1:55-2:45pm, Rinker Hall 0220 Fri. 3:00-3:50pm, Rinker Hall 0220

General Education Designation: Biological Sciences A minimum grade of C is required for general education credit.

Instructor

Amanda Subalusky – <u>asubalusky@ufl.edu</u> Office location: 518A Carr Hall Phone: (352) 294-6311 Office hours: Mon. 11:30 am – 1:30 pm, or by appointment

Teaching Assistants

Susannah Lohmann – <u>s.lohmann@ufl.edu</u> Office location: 517 Carr Hall Office hours: TBD Samantha Howley – <u>samanthahowley@ufl.edu</u> Office location: 610 Bartram Hall Office hours: TBD

Course Description

This course addresses the pressing questions, "How much water do we need, and how do we balance conflicting demands for this critical resource?" We will examine the physical and biological science behind the various stages of the water cycle through lectures and readings, and we will learn about

watershed hydrology and the science of environmental flows through online simulations. We will analyze anthropogenic impacts on water resources through participation in a hypothesis-driven experiment testing the influence of stressors on living stream mesocosms, and we will read and discuss local examples of water resource challenges and solutions. We will reflect on our own use of water through recording a water use diary and calculating our water footprint. We will also reflect on the social and cultural roles of water through readings and discussions, and we will evaluate the role of water in our own lives through creation of a water curation project. This course is part of the Gulf Scholars Program, and it includes material in each component of the course exploring links between changing watersheds and changing coastal ecosystems.

General Education Designation: Biological Sciences (B)

Biological science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the life sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern biological systems. Students will formulate empirically testable hypotheses derived from the study of living things, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

Required & Recommended Course Materials (to purchase/rent)

Readings will be scientific articles from the primary literature and materials provided by the course instructor.

Materials and Supplies Fees: n/a

II. Coursework & Schedule

Assignment	Description	Requirements	Points
Essay 1	An essay that includes reflection on a watershed of the Gulf of Mexico, including important aspects of the watershed's hydrology, how hydrology influences plants and animals in that region, impacts of land cover and climate change, and links with the Gulf of Mexico	750-1000 words	50
Exam 1	Exam on the physical and biological science behind the various stages of the Earth's water cycle and the impacts of global change	In class, closed book	75
Experiment Objectives and Hypotheses	A written assignment in which you identify the primary objective of your experiment and list your hypotheses	250-500 words	10
Scientific Report	A scientifically written report in which you present the objectives, hypotheses, results, and conclusions of your experiment, and place your research within the broader context of challenges and solutions for freshwater resources	2000-2500 words	100

1. List of Graded Work

Part I: In-class exam on anthropogenic impacts or water resources and potential solutionsExam 2Part II: Open book assignment to write a letter to politician, company, or newspaper about a water resource threat of your choice.		Part I: In class, closed book (50 pts) Part II: 500- word letter (50 pts)	100
Water Use Diary	A water use diary for two 24-hour periods, one in which you use water at your normal level, and one in which you try to restrict your water use	A completed diary entry for 2 24-hour periods	25
Water Footprint Calculation	Calculate your water footprint on the waterfootprint.org calculator	A screenshot of your completed water footprint	25
Essay 2	A reflective writing project, based on your water use diary and your water footprint calculation, about your water use and sustainability and how it compares to your peers, to others in the U.S. and to others around the world	750-1000 words	50
Discussion Post	Post in an online discussion forum about observations of water being represented in art	One discussion post on Canvas	15
Water Curation Project	Create a water curation project in which you investigate the role of water in your own life, linked to lessons learned in this course. Projects can use diverse media, including compilations of songs, photos, stories, or artifacts, and will be shared with others in the class	A compilation of media and artifacts accompanied by an explanatory essay or storyboard	50
Course Total			500

2. Weekly Course Schedule

Some details of this schedule may be subject to change. The Canvas site for the course will maintain an updated course schedule and list of assignments throughout the semester.

Week/ Date	Activity	y Topic/Assignment (Question/Subject)	
Week 1	Торіс	Global patterns of temperature and precipitation	
	Summary	We will be introduced to the Earth's water cycle through a brief overview of the major phases. We will discuss global patterns of temperature and precipitation. How is climate change altering those patterns?	
	Readings	The course syllabus	
Week 2	Торіс	Precipitation, transpiration, and runoff	
	Summary	Global patterns in temperature and precipitation drive the distribution of vegetation biomes. We will analyze how different biomes intersect with the water cycle through water uptake, transpiration, and runoff into surface waters. How are these patterns influenced by land use and land cover change?	
	Readings	Leopold. 1997. Precipitation, Infiltration. <i>In</i> Water, Rivers and Creeks. University Science Books, Sausalito, CA.	
	Assignment	Essay 1	Week 4
Week 3	Торіс	Surface waters, evaporation, and discharge downstream	
	Summary	We will learn about the different forms of surface water and how they capture rainfall and runoff, return it to the atmosphere through evaporation, and discharge it downstream to larger receiving water bodies and eventually the ocean. We will discuss the science of environmental flows and linkages between river flow regimes and plants	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
		and animals. How are aquatic plants and animals influenced by hydrology and by anthropogenic alterations to hydrology?	
	Readings	Poff et al. 1997. The natural flow regime: a paradigm for river conservation and restoration. BioScience 47:769-784.	
Week 4	Торіс	Infiltration, groundwater storage, and springs	
	Summary	We will learn how vegetation and soil conditions determine the degree of water infiltration, how water percolates through the ground to recharge groundwater reserves, and the role of springs and other critical recharge zones in connecting surface and groundwater resources. How do these dynamics shape the ecohydrology of Gulf Coast watersheds, and how they can be impacted by anthropogenic changes?	
	Readings	Leopold. 1997. Groundwater. <i>In</i> Water, Rivers and Creeks. University Science Books, Sausalito, CA.	
Week 5	Торіс	Stressors to surface waters	
	Summary	Anthropogenic factors influence the quantity and quality of surface waters available to people and wildlife. We will be introduced to various threats facing our streams and rivers, including water extraction, land use change, contaminant input, and others. How do these threats impact stream ecosystems and aquatic life?	
	Readings	Dudgeon. 2019. Multiple threats imperil freshwater biodiversity in the Anthropocene. Current Biology 29:R960-R967.	
	Assignment	Exam 1	In class
Week 6	Торіс	Building a living stream	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
	Summary	We will discuss the components of a healthy stream ecosystem and work together as a class to build functioning stream mesocosms in the STREAMS experimental stream facility. We will select the different treatments we plan to include in our experiment and plan the methods and data collection we will use to measure their impact. How do we hypothesize these treatments will impact our stream mesocosms?	
	Readings	Bernhardt et al. 2018. The metabolic regimes of flowing waters. Limnology and Oceanography 63:99-118.	
	Assignment	Experiment Objectives and Hypotheses	Week 7
Week 7	Торіс	Challenging our streams	
	Summary	We will observe the "heartbeat" of our healthy stream mesocosms through their dissolved oxygen profiles on the real-time data portal. We will apply the selected treatments to our streams and observe their responses. How do our stream "heartbeats" change and what does this mean? How does this apply to the changes we might see in a real stream?	
	Readings	Arroita et al. 2019. Twenty years of daily metabolism show riverine recovery following sewage abatement. Limnology and Oceanography 64:77-92.	
	Assignment	Scientific Report	Week 9
Week 8	Торіс	Interpreting the data and writing a scientific report	
	Summary	We will discuss data analysis and interpretation using summary results from the experiment. We will discuss the components of a scientific report, including how to search, use, and reference primary scientific literature. How can we place the results of our experiment in a broader context?	
	Readings	UF Libraries Video on Writing and Citing (and Avoiding Plagiarism)	

Week/ Date Activity Topic/Assignment (Question/Subject)			Assigned Work Due
Week 9	Торіс	Solutions for freshwater challenges	
	Summary	We will present potential solutions for the challenges our stream mesocosms faced, as well as other threats to freshwaters that we discussed in class. What are some local examples of freshwater challenges?	
	Readings	Green et al. 2015 Freshwater ecosystem services: pivoting from water crisis to water solutions. Global Environmental Change 34:108-118.	
Week 10	Торіс	Local examples of freshwater challenges and solutions	
	Summary	Using a local example of a freshwater challenge, we will ask what threats they are facing, why they are being threatened, what the impact of those threats will be, and what could be done to mitigate the threats?	
	Readings	Abrams. 2021. The ACF Water Wars Final Episode: Is Florida Entitled to Greater Flow in the Apalachicola River? Preview of United States Supreme Court Cases.	
	Assignment	Exam 2	Part I: In class Part II: Week 11
Week 11	Торіс	Water for basic human need	
	Summary	The World Health Organization has determined that people need a minimum of 20 liters of water per day to satisfy basic human need, including water for consumption, washing, and bathing. How much water do we typically use in our lives? Could we live with access to only 20 liters per day? How would that change our daily activities?	
	Readings	TBD	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
	Assignment	Water Use Diary	Week 13
Week 12	Торіс	Water use and consumption	
	Summary	In addition to basic human need, we also use water for growing and making goods and providing services, and our total water use can vastly exceed the amount we consume. How much water do we use in our daily lives, and how does this compare to the rest of the world? Is this sustainable, and if not, how can we make more sustainable choices?	
	Readings	TBD	
	Assignment	Water Footprint Calculation	Week 13
Week 13	Торіс	Wastewater treatment and solutions	
	Summary	After water is flushed down the drain, where does it go and what happens to it? How does this vary in different regions of our country and the world? What are the most sustainable ways of treating wastewater?	
	Readings	EPA. "Examples of Innovation in the Water Sector." <u>https://www.epa.gov/water-innovation-tech/examples-innovation-water-sector</u>	
	Assignment	Essay 2	Week 14
Week 14	Торіс	Social, cultural, and political roles of water	
	Summary	People also use water and water sources in many ways that are outside the realm of food and water provision. Access to sufficient quantity and quality of water for various uses is often divided along socioeconomic lines. How does water use shape social and	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
		cultural traditions, and how is access to water influenced by social, economic, and political drivers?	
	Readings	Anderson et al. 2019. Understanding rivers and their social relations: a critical step to advance environmental water management. WIREs Water 6:e1381.	
	Assignment	Water Curation Project	Due for the final exam
Week 15	Торіс	Water in music and art	
	Summary	Because of water's fundamental role in our lives, it is often portrayed in music and art. We will discuss the representation of water in these art forms, both historically and in present day. How does water intertwine with the human condition, and how has it been intertwined with our own lives?	
	Readings	TBD	
	Assignment	Discussion Post	The last day of class
	Final	Water Curation Exhibition	Water Curation Project

III. Grading

3. Attendance and Make-ups

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <u>https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/</u>. Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.

4. Grading Scale

Grading rubrics will be provided for all written assignments and for the water curation project.

For information on how UF assigns grade points, visit: <u>https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/</u>

A	94 – 100% of possible points	С	74 – 76%
A-	90 – 93%	C-	70 – 73%
B+	87 – 89%	D+	67 – 69%
В	84 – 86%	D	64 – 66%
B-	80 - 83%	D-	60 – 63%
C+	77 – 79%	E	<60

IV. Quest Learning Experiences

5. Details of Experiential Learning Component

Students will participate in a hypothesis-driven experiment testing the influence of stressors on living stream mesocosms. We will use an artificial stream mesocosm facility that is fully networked for online data observation (https://www.subaluskylab.com/experimental-stream-facility.html). Students will be intimately engaged with bringing rivers to life, presenting them with challenges that mimic real-life stressors on aquatic resources (e.g., decreasing water levels, increasing salinity, eutrophication, etc.), developing hypotheses about the predicted effects, and observing their response. Students will develop a scientific report in which they present the objectives and findings of their experiment, place their research within the broader context of threats to freshwater resources, and examine possible solutions.

6. Details of Self-Reflection Component

Students will reflect on their own relationship with water through several exercises. First, students will monitor their daily water use over a period of normal and restricted use. Students will also use online resources to calculate their typical water footprint and compare it to that of their peers, and others in

the US and around the world. These experiences will form the basis for a reflective writing project about where the students' greatest water needs occur, and how they can improve their sustainable use of water resources. Students will draw upon these reflections for the final course project, which is creation of a water curation project in which they investigate the role of water in their own lives through compilation of songs, photos, stories, or other artifacts.

V. Gulf Scholars Program

7. Details of Student Learning Outcome

This course is part of the newly created Gulf Scholars Program at the University of Florida (https://gulfscholars.bobgrahamcenter.ufl.edu/). This program aims to prepare students from diverse academic backgrounds with the knowledge, skills, and mindset necessary to address the complex and dynamic challenges facing Gulf of Mexico communities. The primary Student Learning Outcome for this course related to this program is Knowledge of the Gulf of Mexico, in which students can describe ecological, socio-political, and economic challenges that have historically impacted Gulf communities. Students in this course will choose a watershed in the broader Gulf of Mexico catchment to study in detail. They will learn about the hydrology of this watershed and how it has been impacted by global change. They will study the unique plants and animals that inhabit this watershed and explore the impacts of changing hydrology on biodiversity. They will write an essay synthesizing their findings and exploring the links between their watershed and the Gulf of Mexico.

VI. General Education and Quest Objectives & SLOs

8. This Course's Objectives—Gen Ed Primary Area and Quest

Objectives will be This Course's Objectives -> **Accomplished By: Biological Sciences** Quest 2 Objectives -> Objectives 🗲 (This course will....) (This course will accomplish the objective in the box at left by...) **Biological science courses** Address in relevant ways the Explore the physical and biological Reading and discussing scientific science behind the various phases literature about the phases of provide instruction in the history, key themes, principles, and pathways of the Earth's water terminologies, theories, or the water cycle and major basic concepts, theories, and terms of the scientific methodologies of the various cvcle drivers of change method in the context of the social or biophysical science life sciences. disciplines that enable us to address pressing questions and challenges about human society and/or the state of our planet. Present different social and/or Explore the ways in which various Reading and discussion about Courses focus on major scientific developments and biophysical science methods and drivers of global change are global and local examples of theories and consider how their their impacts on society, impacting the water cycle and the freshwater challenges and identification of causes, science and the environment, biases and influences shape availability of water resources for and the relevant processes pressing questions about the people and nature consequences, and solutions human condition and/or the state that govern biological of our planet. systems.

Biological Sciences + Quest 2 + Course Objectives

Biological Sciences Objectives →	Quest 2 Objectives 🗲	This Course's Objectives → (This course will)	Objectives will be Accomplished By: (This course will accomplish the objective in the box at left by)
Students will formulate empirically-testable hypotheses derived from the study of living things, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.	Enable students to analyze and evaluate (in writing and other forms of communication appropriate to the social and/or biophysical sciences) qualitative or quantitative data relevant to pressing questions concerning human society and/or the state of our planet.	Empirically test the effect of selected stressors on stream ecosystems and propose solutions	Conducting an experiment in experimental stream mesocosms in which students develop hypotheses, analyze results, and propose solutions for selected stressors common in freshwater systems
Biological science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the life sciences.	Analyze critically the role social and/or the biophysical sciences play in the lives of individuals and societies and the role they might play in students' undergraduate degree programs.	Evaluate the role of water in people's lives, both for basic human need and for social and cultural uses	Quantifying our own water use and water footprint and reflecting on our water consumption relative to local and global comparisons; Examining representations of water in art and culture, and using a curation project to reflect on the role of water in our own lives
	Explore or directly reference social and/or biophysical science resources outside the classroom and explain how engagement with those resources complements classroom work	Exploration of the outdoors and web-based resources (e.g., online museum collections) as a lens through which to evaluate the intersection of both biology and culture with water	A field trip outdoors to observe intersections between species' natural history and the water cycle; Guest speakers and explorations of online museum collections to observe the representation of water and its social and cultural roles in art

9. This Course's Student Learning Outcomes (SLOs)—Gen Ed <u>Primary</u> Area and Quest

	Biological Sciences SLOs → Students will be able to	Quest 2 SLOs → Students will be able to	This Course's SLOs → Students will be able to	Assessment Student competencies will be assessed through
Content	Identify, describe, and explain the basic concepts, theories and terminology of natural science and the scientific method; the major scientific discoveries and the impacts on society and the environment; and the relevant processes that govern biological and physical systems.	Identify, describe, and explain the cross-disciplinary dimensions of a pressing societal issue or challenge as represented by the social sciences and/or biophysical sciences incorporated into the course.	Identify, describe, and explain the physical and biological science behind the various phases of the water cycle, the influence of global change on these processes, the net impact on surface water quantity and quality, and the influence of surface water hydrology on aquatic life	Exam 1 (the water cycle and global change); Essay 1 (influence of the water cycle on species' natural history)
Critical Thinking	Formulate empirically- testable hypotheses derived from the study of physical processes or living things; apply logical reasoning skills effectively through scientific criticism and argument; and apply techniques of discovery and critical thinking effectively to solve scientific problems and to evaluate outcomes.	Critically analyze quantitative or qualitative data appropriate for informing an approach, policy, or praxis that addresses some dimension of an important societal issue or challenge.	Critically analyze global and local challenges facing freshwater resources and identify potential solutions; Formulate testable hypotheses about the impact of stressors on stream ecosystems; Analyze and Evaluate results from an experiment testing those hypotheses	Exam 2 (freshwater challenges and solutions); Objectives and Hypotheses assignment; Scientific Report on stream mesocosm experiment

Biological Sciences + Quest 2 + Course SLOs

	Biological Sciences SLOs → Students will be able to	Quest 2 SLOs → Students will be able to	This Course's SLOs → Students will be able to	Assessment Student competencies will be assessed through
Communication	Communicate scientific knowledge, thoughts, and reasoning clearly and effectively.	Develop and present, in terms accessible to an educated public, clear and effective responses to proposed approaches, policies, or practices that address important societal issues or challenges.	Write a scientific report presenting the objectives, hypotheses, methods, results, and implications of an experiment testing the influence of stressors on stream mesocosms; Develop potential solutions for the stressors examined; Communicate freshwater challenges with people from other fields	Scientific Report on stream mesocosm experiment; Exam 2 letter about a water resources threat
Connection	N/A	Connect course content with critical reflection on their intellectual, personal, and professional development at UF and beyond.	Reflect on the role of water in their own lives, for consumption as well as for social and cultural reasons; Evaluate the sustainability of their actions; Connect about themes of water in art and music	Essay 1 (reflection on key elements of the water cycle in your home biome); Exam 2 (a letter on a water resources threat of personal concern); Water Use Diary; Water Footprint Calculation; Essay 2 (reflection on personal water use and sustainability); Discussion Post (water in art); Water Curation Project (role of water in our lives)

VII. Course Policies

10. Teaching Philosophy

We will endeavor to help you succeed in accomplishing the above objectives. We will do our best to address your concerns and questions regarding the course materials, policies, and grading. You are encouraged to ask questions during lectures and labs. You are also welcome to speak with us during office hours, make an appointment, or contact us by e-mail.

Your thoughtful participation and scholarship are essential to the success of this course. A significant portion of lecture and discussion time will be devoted to open discussion and exchange of ideas. Students are encouraged to employ critical thinking and to rely on data and verifiable sources to interrogate all assigned readings and subject matter in this course as a way of determining whether they agree with their classmates and/or their instructor. No lesson is intended to espouse, promote, advance, inculcate, or compel a particular feeling, perception, viewpoint or belief.

11. Students Requiring Accommodation

Students who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

12. Course Evaluations

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

13. University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<u>https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/</u>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

14. Resources Available to Students

Health and Wellness

- U Matter, We Care: <u>https://umatter.ufl.edu</u>; <u>umatter@ufl.edu</u>; 392-1575
- Counseling and Wellness Center: <u>http://www.counseling.ufl.edu/cwc/Default.aspx</u>; 392-1575
- Sexual Assault Recovery Services (SARS): <u>https://umatter.ufl.edu/helping-students/sexual-violence-response/;</u> Student Health Care Center; 392-1161
- University Police Department: <u>http://www.police.ufl.edu/;</u> 392-1111 (911 for emergencies)

Academic Resources

- *E-learning technical support*: <u>Learningsupport@ufl.edu</u>; <u>https://lss.at.ufl.edu/help.shtml</u>; 352-392-4357 (opt. 2)
- *Career Resource Center*: <u>http://www.crc.ufl.edu/</u>; Reitz Union; 392-1601
- Library Support: <u>http://cms.uflib.ufl.edu/ask</u>
- *Teaching Center*: <u>https://umatter.ufl.edu/office/teaching-center/</u>; Broward Hall; 392-2010 or 392-6420
- Writing Studio: http://writing.ufl.edu/writing-studio/; 302 Tigert Hall; 846-1138

15. Procedure for Conflict Resolution

Any classroom issues, disagreements or grade disputes should be discussed first between the instructor and the student. If the problem cannot be resolved, please contact the Undergraduate Coordinator or the Department Chair. Be prepared to provide documentation of the problem, as well as all graded materials for the semester. Issues that cannot be resolved departmentally will be referred to the University Ombuds Office (<u>http://www.ombuds.ufl.edu</u>; 392-1308) or the Dean of Students Office (<u>http://www.dso.ufl.edu</u>; 392-1261). For further information refer to <u>https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf</u> (for residential classes) or <u>http://www.distance.ufl.edu/student-complaintprocess</u> (for online classes).