

IDS 2935: Water for People and Nature

Quest 2

I. Course Information

Spring 2023

Lectures: Tues. 12:50-1:40pm, Thurs. 12:50-1:40pm, MCCC0100

Small Group Sessions:

Fri. 9:35-10:25am, TUR2305

Fri. 10:40-11:30am, TUR2353

Fri. 11:45am-12:35 pm, MCCBG108

General Education Designation: Biological Sciences

A minimum grade of C is required for general education credit.

Instructor

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Teaching Assistant

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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. We will incorporate a Virtual Exchange with undergraduate students from University of Eldoret in Kenya. We will learn some basic Swahili throughout the course to facilitate communication, and we will conduct class exercises together during the final three weeks of class.

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 the book “Mirage” by Cynthia Barnett.

Cynthia Barnett. 2007. Mirage: Florida and the Vanishing Water of the Eastern U.S. The University of Michigan Press, Ann Arbor, MI, USA.

Materials and Supplies Fees: n/a

II. Coursework & Schedule

1. List of Graded Work

Assignment	Description	Requirements	Points
Swahili Quizzes	We will learn ~5 Swahili words about each week’s topic, and we will have short quizzes on these words every 3 weeks.	5 points/quiz * 5 quizzes	25
Essay 1	An essay that includes reflection on which biome and watershed you grew up in, important aspects of your watershed’s hydrology, and how hydrology influences plants and animals in that region	750-1000 words	25
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	100
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
Exam 2	Part I: In-class exam on anthropogenic impacts on water resources and potential solutions Part II: Open book assignment to write a letter to a 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 (25 pts)	75

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 restrict your water use to 20 liters (the quantity designated for basic human need)	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 in the U.S. and Kenya	750-1000 words	50
Discussion Post	Post in an online discussion forum with students in Kenya 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, through compilation of songs, photos, stories, or artifacts, and share it with the class in an exhibition during the final exam period	A compilation of media and artifacts accompanied by an explanatory essay or storyboard	50
Course Total			500

2. Weekly Course Schedule

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
Week 1	Topic	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	
	Swahili	Week 1 vocabulary	
Week 2	Topic	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
	Swahili	Week 2 vocabulary	
Week 3	Topic	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. <i>BioScience</i> 47:769-784.	
	Swahili	Week 3 vocabulary	Swahili Quiz
Week 4	Topic	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 central Florida, and how they can be impacted by anthropogenic changes?	
	Readings	Leopold. 1997. <i>Groundwater</i> . In <i>Water, Rivers and Creeks</i> . University Science Books, Sausalito, CA.	
	Swahili	Week 4 vocabulary	
Week 5	Topic	Stressors to surface waters	
	Summary	Anthropogenic factors are influencing 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 et al. 2006. Freshwater biodiversity: importance, threats, status, and conservation challenges. <i>Biological Reviews</i> 81:163-182.	
	Assignment	Exam 1	In class

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
	Swahili	Week 5 vocabulary; Swahili Club Game	
Week 6	Topic	Building a living stream	
	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. <i>Limnology and Oceanography</i> 63:99-118.	
	Assignment	Experiment Objectives and Hypotheses	Week 7
	Swahili	Week 6 vocabulary	Swahili Quiz
Week 7	Topic	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. <i>Limnology and Oceanography</i> 64:77-92.	
	Assignment	Scientific Report	Week 9
	Swahili	Week 7 vocabulary	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
Week 8	Topic	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)	
	Swahili	Week 8 vocabulary	
Week 9	Topic	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.	
	Swahili	Week 9 vocabulary	Swahili Quiz
Week 10	Topic	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	Cynthia Barnett, "Mirage", Ch. 1-3, pp. 1-58	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
	Assignment	Exam 2	Part I: In class Part II: Week 11
	Swahili	Week 10 vocabulary; Swahili Club game	
Week 11	Topic	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	Cynthia Barnett, "Mirage", Ch. 4-6, pp.59-113	
	Assignment	Water Use Diary	Week 13
	Swahili	Week 11 vocabulary	
Week 12	Topic	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	Cynthia Barnett, "Mirage", Ch. 7-8, pp. 114-144	
	Assignment	Water Footprint Calculation	Week 13
	Swahili	Week 12 vocabulary	Swahili Quiz

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
Week 13	Topic	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." https://www.epa.gov/water-innovation-tech/examples-innovation-water-sector Cynthia Barnett, "Mirage", Ch. 9-10, pp. 145-167	
	Assignment	Essay 2	Week 14
	Swahili	Week 13 vocabulary	
Week 14	Topic	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 cultural traditions, and how is access to water influenced by social, economic, and political drivers?	
	Readings	Cynthia Barnett, "Mirage", Ch. 11-12	
	Assignment	Water Curation Project	Due for the final exam
	Swahili	Week 14 vocabulary	
Week 15	Topic	Water in music and art	

Week/ Date	Activity	Topic/Assignment (Question/Subject)	Assigned Work Due
	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	Anderson et al. 2019. Understanding rivers and their social relations: a critical step to advance environmental water management. WIREs Water 6:e1381.	
	Assignment	Discussion Post	The last day of class
	Swahili	Week 15 vocabulary; Swahili club game	Swahili Quiz
	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: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

If you are experiencing COVID-19 symptoms ([click here for guidance from the CDC on symptoms of coronavirus](#)), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms](#). 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: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

A	94 – 100% of possible points		C	74 – 76%
A-	90 – 93%		C-	70 – 73%
B+	87 – 89%		D+	67 – 69%
B	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 write an essay about important aspects of the water cycle in the biome in which they grew up in, information about their home watershed, and how watershed hydrology influences plants and animals in that region. Second, students will write a letter to a politician, company, or newspaper about a water resources threat of personal concern to them. Third, students will monitor their daily water use and aim to use only 20 liters in one 24-hour period, in accordance with the World Health Organization's classification of basic human water need. Students will also use online resources to calculate their typical water footprint and compare it to that of university students in Kenya, as well as other people across the world. These experiences will form the basis for a reflective writing project about where the student's greatest water needs occur, how they can improve their sustainable use of water resources, and the importance of improved water supplies to development. Finally, through readings, guest speakers, small-group discussions, and a virtual exchange with Kenyan students, students will reflect upon the various social and cultural roles that water plays and how water is intertwined with human experience, and they will share a discussion post with the class on this topic. 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. General Education and Quest Objectives & SLOs

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

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

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...)
<p>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.</p>	<p>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.</p>	<p>Empirically test the effect of selected stressors on stream ecosystems and propose solutions</p>	<p>Conducting an experiment in experimental stream mesocosms in which students develop hypotheses, analyze results, and propose solutions for selected stressors common in freshwater systems</p>
<p>Biological science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the life sciences.</p>	<p>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.</p>	<p>Evaluate the role of water in people's lives, both for basic human need and for social and cultural uses</p>	<p>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</p>
	<p>Explore or directly reference social and/or biophysical science resources outside the classroom and explain how engagement with those resources complements classroom work</p>	<p>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</p>	<p>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</p>

8. This Course's Student Learning Outcomes (SLOs)—Gen Ed Primary Area and Quest

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...
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 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 with students from Kenya	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)

VI. Course Policies

9. 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.

10. 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/>.

11. 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 (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) 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.

12. Resources Available to Students

Health and Wellness

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

Academic Resources

- *E-learning technical support*: Learningsupport@ufl.edu; <https://lss.at.ufl.edu/help.shtml>; 352-392-4357 (opt. 2)
- *Career Resource Center*: Reitz Union; <http://www.crc.ufl.edu/>; 392-1601
- *Library Support*: <http://cms.uflib.ufl.edu/ask>

- Teaching Center: Broward Hall; 392-2010 or 392-6420
- Writing Studio: 302 Tigert Hall; <http://writing.ufl.edu/writing-studio/>; 846-1138

13. 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 (<http://www.ombuds.ufl.edu>; 392-1308) or the Dean of Students Office (<http://www.dso.ufl.edu>; 392-1261). For further information refer to https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf (for residential classes) or <http://www.distance.ufl.edu/student-complaintprocess> (for online classes).