USC Dornsife
Dana and David Dornsife
College of Letters, Arts and Sciences
Spatial Sciences Institute

SSCI 265Lg, The Water Planet

Syllabus

Units: 4

Term — Day — Time: Spring 2017-TuTh-11:00 a.m.-12:20 p.m.

Location: THH 102 (lectures), AHF 145A (labs)

Co-Instructor: John P. Wilson
Office: AHF B55F
Regular Office Hours: Mon 1-2 p.m. and Wed 9-10 a.m. PT. Also available by appointment via email.

Contact Info: jpwilson@usc.edu, 213-740-1908, www.bluejeans.com/jpwilson

Co-Instructor: Elisabeth Sedano
Office: AHF B57C
Regular Office Hours: Thu and Fri 1-2 p.m. PT. Also available by appointment via email.

Contact Info: sedano@usc.edu, 213-740-9582, www.bluejeans.com/u/sedano

Laboratory Co-Instructor: Jason Post
Office: AHF B54A
Regular Office Hours: Tues and Weds 1-2 p.m. Also available by appointment via email.

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Office: VKC B40A
Office Hours: By appointment
Contact Info: klpeter@usc.edu, 213-740-1700 (office)

Course Description

This course entails a comprehensive investigation into the multi-faceted dimensions of water on Earth. Topics range from micro-scale concerns (e.g. water properties, form, and behavior) to regional-scale issues (e.g. water resource distribution, groundwater mining, and watershed dynamics) to global-scale processes such as the hydrologic cycle including atmospheric and oceanic circulation. Although there are many perspectives from which to approach the topic of water (e.g. economic, legal, political, institutional, and engineering perspectives), we will situate our investigation within a scientific framework with particular focus on scientific methodologies and the unique insights that science is able to reveal.

Attention will also be directed to the human (social science) dimensions of water supply and demand, and the implications for past and future societies. Water has specific societal significance because it is essential for sustaining life, directly and indirectly. Water is a necessary component of most agricultural and industrial processes, and it serves a central role in global and regional transportation networks. There are extensive technological dimensions to meeting the challenges of adequate water supply that are critical to human existence. We will examine these aspects through a series of case studies that simultaneously explore the water footprint of modern consumer societies and how various cultures and countries have been shaped by some of the world's largest and most iconic rivers as well as some other globally significant freshwater sources.

This course satisfies the requirements for General Education Category E (Physical Sciences). Courses in this category are intended to bring to bear the perspectives of several scientific disciplines on a theme, illustrating the relevant scientific principles, their technological applications, and the societal significance and consequences. The GE designation further requires that the course content give students the opportunity to think critically through focused inquiry into a particular area of knowledge. Scientific methodologies, analytical techniques, and digital scholarship will be stressed.

The overall goal of the GE Program is to provide necessary context for an informed citizenry, and therefore these courses emphasize a broad sweep of knowledge and require active intellectual engagement with scientific principles. In practice, this means that students will be introduced to many concepts and terminologies that may be new and unfamiliar. The focus, nevertheless, will be on applying basic principles to specific problems rather than simple description, memorization, and recapitulation.

Learning Objectives

The central learning objective of this course is to enable students to understand the special properties of water and the fundamental role it plays in the functioning of the Earth, with or without the presence or engagement of people.

The goal of the class sessions is to enable students to understand the spatial and temporal character of water-related processes, and how these help to shape the basic physical,

environmental, and social aspects of the world's water supply. This will be accomplished using two complementary and parallel threads: the first (offered by Professor Wilson) follows the processes that move water around Planet Earth in a series of (relatively) unspoiled landscapes like Yellowstone and Yosemite National Parks and the second (offered by Professor Sedano) considers the myriad of ways in which people have intersected and interrupted these processes along with the intended and unintended consequences that have followed from these interventions.

The goal of the lab sessions is to enable students to understand the value of spatial knowledge, maps, and the spatial representation of water information. Students will conduct and reflect on a series of small, self-contained experiments and investigations in the first seven lab sessions before switching their attention to the final course project called a "story map," in which students will perform analysis using GIS tools and also learn about the challenges of and methods for synthesizing and communicating science with the public and policymakers. In our digital world, understanding and producing visual communication is just as important to informed citizenship as writing. The use of these tools is complemented by focused writing assignments in which students reflect on policy implications of laboratory experiences. In this course, students will learn basic cartographic principles and how to integrate existing spatial datasets and other digital resources into maps to attractively communicate underlying science and policy. By the end of the course, students will be able to evaluate scientific claims and discuss alternative pathways toward sustainability with enriched understanding of the scientific context of knowledge and communication skills.

Prerequisite(s): None
Co-Requisite(s): None

Required Readings and Supplementary Materials

Please acquire the texts listed below. All are available at the USC Bookstore. All other supplementary reading listed in the syllabus are available under the tab marked "Readings" on the course Blackboard.

The required textbooks for this course are:

- Davie, T. 2008. *Fundamentals of Hydrology*. 2nd Edition. New York, NY: Routledge.
- Hoekstra, A. Y. 2013. *The Water Footprint of Modern Consumer Society.* New York, NY: Routledge.

Supplementary readings for this course are:

- Jones, J. A. A. 2010. *Water Sustainability: A Global Perspective.* New York, NY: Routledge. While you may purchase this book if you wish to own a bound copy, it is available online through the USC Libraries. Sign on to the USC Libraries and search for this title.
- McPhee, J. 1988, September 26, October 3. "The Control of Nature: Los Angeles Against the Mountains, Parts 1 and 2," *The New Yorker*.

Description and Assessment of Assignments

Students must attend all regularly scheduled lectures/in-class exercises, participate in labs, write two policy essays, sit for 12 weekly in-class quizzes and the final examination, and produce a final project called a "story map."

Labs

In addition to the lectures and in-class exercises, there is a set of 12 labs spread across the semester. These laboratory experiences are designed to introduce you to the tools of scientific inquiry and to give you practical experience in implementing these tools to explore various problems within the framework of the scientific method. These assignments are linked to the lectures and class discussions, but do not duplicate the lecture experience. You must register for one laboratory session in addition to registering for the class itself. Your laboratory assignments will be completed during the 2-hour lab sessions and shortly after will be graded and returned.

Absences from lab sessions must be requested by sending an email to the laboratory co-instructor for your lab section. Excused absences from labs will be granted only for valid reasons; please notify us of the reason for your absence in your email.

The mapping software and geospatial data required for the lab assignments will be accessed using computing resources provided by the Spatial Sciences Institute.

Weekly Quizzes

There will be 12 quizzes in which students will be quizzed on the concepts, ideas, and case studies from the previous week's class. These quizzes will be given at the beginning or end of either the Tuesday or Thursday class each week. The first quiz will be offered in the third week of classes and the last one will be offered in Week 14. The quizzes are an important component of the class and among other things, eliminate the need for you to sit for one or two midterm exams.

Policy Essays

There will be two policy essays written in response to prompts from one of the instructors in lecture and/or lab. These assignments will have detailed requirements with respect to required outside research and source citations. Please follow the requirements for this pair of assignments very carefully.

Story Map

The final project in this course is a story map. Story maps tell about places, issues, and trends by enriching digital maps with content such as various kinds of graphs, text, photographs, video, and audio. The underlying data often depict the coupling of social and natural systems. These may be things like wetland areas, land cover, and census data, and may also include live data such as temperature, precipitation, and streamflow. They often present scientific data and

analysis, but they are mainly designed for the general public and do not require their users to have special knowledge or skills in geographic information software and services.

Story maps are increasingly in use in science and are an important tool to describe the challenges of water science and pathways toward sustainability. For example, you can see an interactive story map that describes the great wetlands of the world and some of the ways people are working to protect these undervalued natural treasure here: http://story.maps.arcgis.com/apps/MapSeries/index.html?appid=aed61922c4b444ba843d19e676e80004. This story map was created the Esri Story Maps team. Another example uses the Global Land Data Assimilation System (GLDAS) and offers an unprecedented look at the Earth's water cycle (see http://esripm.maps.arcgis.com/apps/MapJournal/index.html?appid=b6ae89f10d5145d593ec2fc3ce656035).

In this course, you will create a story map that integrates data on social and natural systems around the presence (or absence), quality, and movement of water on or near the Earth's surface. Additional information on each learning module and the potential for final projects is provided on the course Blackboard site. Your story map will integrate scientific data like the examples above but will be focused at local scales. An example of this sort of integration is a map story of the Southern California Steelhead produced by the Aquarium of the Pacific (see http://aop.maps.arcgis.com/apps/MapJournal/index.html?appid=20dd025d97da4326a5aae4e0ffbc69f3). For an example of a river revitalization map story, see http://ugis.esri.com/LA_River_Tour/#map. Please note, however, that this particular story map, like some examples of story maps you may see on the web, is simply a montage of geotagged photographs. Your story map will be much more than this. It may have photos for context, but it must be primarily an analytical report that includes writing in pop-up windows and sidebars. It will use visualization of data or models, like in the other examples linked above, to communicate underlying analysis.

Exams and Other Policies

Both the weekly quizzes and final exam are closed book. The weekly quizzes and final exam will include content learned in course readings, lectures, laboratory sessions, and in-class exercises up until the date of each quiz or exam. This means that the final exam will cover materials spread across the entire semester. **No make-up opportunities will be offered for missed quizzes, labs or exams,** so mark the appropriate dates on your calendars! If you have a legitimate conflict, speak with the instructor as soon as possible. Also, note that there is **no credit for late assignments.** The date and time for this exam are listed in the Course Schedule below.

Grading Breakdown

The table at the top of the next page shows the breakdown of the assignments and their weight in the final grade. The emphasis is on regularly completing a number of short assignments as well as solid performance on examinations and the final project. Assignments must be submitted as noted, typically on the appropriate Blackboard (Bb) site.

Assessment	Number	Total Points (% of Grade)
Weekly Quizzes (in class closed book)	12	24
Laboratory Reports (Submit all lab reports via Bb no later than 11:55 p.m. on the day of your lab session)	7	14
Policy Essays (Submit in class & on Lecture Bb)	2	16
Final Exam (Closed book)	1	30
Final Project: Story Map (Submit URL to Bb) and give oral report	1	16
Totals	23	100

Schedule

Date	Topics	Readings	Deliverables/Due Dates
Week 1			
1/10	[Wilson] Introduction to Course and the Role of Space and Time in Framing Hydrologic Knowledge	Jones, Ch. 1	No deliverables
1/12	[Sedano] Special Properties of Water	Jones, Ch. 11	No deliverables
Week 2			
1/17	[Sedano] Role of Water in Human Civilization	Jones, Ch. 2	No deliverables
1/19	[Sedano] Development, Urbanization, and Modernization	Jones, Ch. 12-14	No deliverables
Week 3			
1/24	[Sedano] History of Water in Los Angeles	McPhee, Part 1	Weekly quiz given in lecture
1/26	[Sedano] Virtual Tour of the Los Angeles River	McPhee, Part 2	Lab #1 is due in Bb by 11:55 p.m. the same day as your lab session

Week 4			
1/31	[Wilson] Role of Water in Our Physical World	Davie, Ch. 1	Weekly quiz given in lecture Lab #2 is due in Bb by 11:55 p.m. the same day as your lab session
2/2	[Wilson] Precipitation	Davie, Ch. 2	
Week 5			
2/7	[Wilson] Evaporation	Davie, Ch. 3	Weekly quiz given in lecture Lab #3 is due in Bb by 11:55 p.m. the same day as your lab session
2/9	[Sedano] Uneven Access	Jones, Ch. 3-4, 6, 7, & 9	
Week 6			
2/14	[Sedano] Concept of Virtual Water	Hoekstra, Ch. 1-2 Jones, Ch. 8	Weekly quiz given in lecture Lab #4 is due in Bb by 11:55 p.m. the same day as your lab session
2/16	[Wilson] Storage	Davie, Ch. 4	
Week 7			
2/21	[Wilson] Groundwater	Davie, Ch. 4	Weekly quiz given in lecture Lab #5 is due in Bb by 11:55 p.m. the same day as your lab session
2/23	[Wilson] Runoff	Davie, Ch. 5	
Week 8			
2/28	[Wilson] Rivers and Streamflow	Davie, Ch. 5	Weekly quiz given in lecture Lab #6 is due in Bb by 11:55 p.m. the same day as your lab session
3/2	[Wilson] Rivers, Sediment Production and Transport	Davie, Ch. 6	
Week 9			
3/7	[Wilson] Atmospheric and Oceanic Circulation	Jones, Ch. 16-19	Weekly quiz given in lecture Lab #7 is due in Bb by 11:55 p.m. the same day as your lab session
3/9	[Sedano] Water Footprints of Global Products	Hoekstra, Ch. 3 & 6-8	

			3/10: Policy Essay #1 due (Hard Copy) and submitted to Bb by the start of class
Week 10			
3/21	[Wilson] Water Footprints of Bovines	Hoekstra, Ch. 4	Weekly quiz given in lecture
3/23	[Sedano] Water Footprints of Cotton	Hoekstra, Ch. 5	
Week 11			
3/28	[Sedano] Commercialization of Water		Weekly quiz given in lecture Lab Story Map Proposal due in Bb by 11:55 p.m. the same day as your lab session
3/30	[Sedano] Societal and Environmental Challenges of Climate Change	Jones, Ch. 10	
Week 12			
4/4	[Wilson] Water Quality	Davie, Ch. 7 Jones, Ch. 5 & 15	Weekly quiz given in lecture Lab Story Map Progress Report #1 is due in Bb by 11:55 p.m. the same day as your lab session
4/6	[Wilson] Ganges River		
Week 13			
4/11	[Sedano] Rivers, Floods, and Floodplains	Davie, Ch. 6 Jones, Ch. 20	Weekly quiz given in lecture Lab Story Map Progress Report #2 is due in Bb by 11:55 p.m. the same day as your lab session 4/14: Policy Essay #2 due (Hard Copy) and submitted to Bb by the start of class
4/13	[Sedano] Precipitation, Evapotranspiration, and Drought	Jones, Ch. 20	
Week 14			
4/18	[Sedano] Water Resources in a Sustainable World	Hoekstra, Ch. 9, 12-14 Jones, Ch. 21-22	Weekly quiz given in lecture
4/20	[Wilson] Water Management: How Can Science Contribute?	Davie, Ch. 8 Hoekstra, Ch. 10-11	

Week 15			
4/25	[Wilson] Water Management: How Can Geodesign Contribute?	Davie, Ch. 8 Hoekstra, Ch. 10-11	Oral Story Map presentation in lab session and final Story Map report with URL due before the start of your lab session
4/27	[Wilson + Sedano] Final Exam Review		
5/9	**Final Examination (11 a.m. to 1:00 p.m.; Closed Book; Location: our Regular Lecture Hall)**		

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* https://policy.usc.edu/student/scampus/part-b/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* http://equity.usc.edu or to the *Department of Public Safety* http://adminopsnet.usc.edu/department/department-public-safety. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Relationship and Sexual Violence Prevention Services* http://engemannshc.usc.edu/rsvp/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.