

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

## SSCI 265Lg, The Water Planet

Units: 4

Term—Day—Time: Fall, 2015, Tuesdays and Thursdays 11:00 a.m.-12:20 p.m.

Location: Taper Hall, THH 102

Co-Instructor: Dr. John P. Wilson Office: AHF B55E Office Hours: Wednesdays and Fridays, 9:00-10:00 a.m., or by appointment Contact Info: jpwilson@usc.edu, 213-740-1908

Co-Instructor: Dr. Daniel N. Warshawsky Office: AHF B55B Office Hours: Mondays, 9:00-10:00 a.m., Thursdays, 1:00-2:00 p.m., or by appointment Contact Info: warshaws@usc.edu, 213-740-2876

Lab Instructor: Dr. Lisa Sedano Office: AHF B57C Office Hours: Mondays, 3:00-4:00 p.m., Wednesdays 1:00-2:00 p.m., or by appointment Contact Info: sedano@usc.edu, 213-740-5910

IT Help: Richard Tsung Hours of Service: Monday to Friday, 9:00 a.m.-5:00 p.m. Contact Info: ctsung@usc.edu, 213-821-4415

## **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 (in)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 three of the world's largest and most iconic rivers: the Amazon, the Ganges, and the Yangtze.

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

On completion of this course, students will be able 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.
- Understand the spatial and temporal character of water related processes and resources.
- Recognize the value of spatial knowledge, maps, and the spatial representation of water data.
- Understand the basic physical, environmental, and social aspects of the world's water supply.

Prerequisite(s): None Co-Requisite (s): None Concurrent Enrollment: None Recommended Preparation: None

#### **Course Notes**

In addition to the lectures, there are a series of laboratory experiences that 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 weekly laboratory assignments will be graded and returned, and the final exam will include material from the class and laboratory component.

No make-up dates will be offered for missed quizzes or exams, so mark the appropriate dates on your calendars! If you have a legitimate conflict, speak with John Wilson, Daniel Warshawsky, or Lisa Sedano as soon as possible so we can make alternative arrangements.

### Technological Proficiency and Hardware/Software Required

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

#### **Required Readings**

Davie, T. 2008. *Fundamentals of Hydrology*. Second Edition. New York: Routledge. (Available for purchase in the USC bookstore)

- Hoekstra, A. Y. 2013. *The Water Footprint of Modern Consumer Society*. New York: Routledge. (Available for purchase in the USC bookstore)
- Jones, J. A. A. 2010. *Water Sustainability: A Global Perspective*. New York: Routledge. (Available for download as an e-book through USC libraries)

### **Description and Assessment of Assignments**

<u>Class Reports</u> (8%): Two class reports are required for this class. Although topics vary each semester, reports typically ask students to conduct independent research and integrate course concepts into an essay. Each report contributes up to 4% towards a student's final grade.

<u>Weekly Quizzes</u> (28%): Once a week, students will be quizzed on material from the previous week of class. These quizzes will be given either at the beginning or end of class. There are 14 total quizzes, and each quiz contributes up to 2% towards the student's final grade.

<u>Lab Assignments</u> (14%): There are seven lab assignments in this class. Each lab assignment is completed in the weekly two-hour lab session, led by Dr. Sedano. Students utilize their knowledge of water resources and geospatial mapping technologies to successfully complete each of these lab assignments.

<u>Story Map Project</u> (20%): As part of this class, students create a story map project in Labs 8 through 12. These lab sessions will combine individual as well as collaborative work and involve the creation and publication of a series of maps that will be used along with other

digital materials (charts, photographs, text, existing and possibly live-streamed sensor data, video clips, video streaming, etc.) to tell a water-related story. These stories will be presented in labs and the best stories will be published on the Spatial Sciences Institute website.

<u>Final Examination</u> (30%): The final exam in this class covers material from all parts of the class, including lecture, labs, and readings, spread across the entire semester. This exam is scheduled for 8:00 to 10:00 a.m. on Tuesday, 15<sup>th</sup> December.

Assignment	Number	% of
_		Grade
Class Reports	2	8
Weekly Quizzes	14	28
Lab Assignments	7	14
Story Map Project	1	20
Final Exam	1	30
TOTAL		100

## Assignment Submission Policy

Assignments will be submitted for grading via Blackboard using the due dates specified in the Course Schedule below.

### **Additional Policies**

Students are expected to attend and participate in every class session and to complete and upload all assignments before the deadlines detailed in the Course Schedule. No late work is accepted.

### Course Schedule: A Weekly Breakdown

	Topics/Daily	Readings and Homework	Deliverables/Due
	Activities		Dates
Week 1	Introduction to	Davie, Ch. 1	No deliverables
8/25	<b>Class and Special</b>		
8/27	Properties of		
	Water		
Week 2	The Hydrologic	No reading	Weekly quiz in lecture
9/1	Cycle and the		Lab 1 is due to
9/3	Significance of		Blackboard by 11.55
	Space and Time		p m the same day as
	Introduction to the		p.m. the same day as
	hydrologic cycle and		your lab session
	the role of space and		
	time in framing both		
	hydrological		
	investigations and		
	understanding		

Week 3	Precipitation and	Davie, Ch. 2-3	Weekly quiz in lecture
9/8	Evaporation	<i>,</i>	5 1
9/10	Exploration of the		
,	processes of		
	precipitation and		
	evaporation and the		
	factors controlling		
	their distribution		
	across space and		
	time		
Week 4	Storage and	Davie Ch 4	Weekly quiz in lecture
9/15	Groundwater		
9/17	Discussion of the		Lab 2 is due to
<i>&gt;</i> /1/	hydrologic processes		Blackboard by 11:55
	associated with the		p.m. the same day as
	storage and		your lab session
	groupdwater in		
	specific kinds of		
	landscapes		
W/colr 5		Davia Ch 5	Wooldy only in losters
weeк 5	Runoii, Rivers,	Davie, Cn. 5	weekly quiz in lecture
9/22			Lab 3 is due to
9/24	Processes Diagnasian of		Blackboard by 11:55
	Discussion of		p.m. the same day as
	nyarologic		your lab session
	principles benind		-
	runoff, rivers and		
	related fluvial		
	processes		**** 11 • • 1
Week 6	Rivers, Streamflow	Davie, Ch. 6	Weekly quiz in lecture
9/29	Analysis and		Lab 4 is due to
10/1	Modeling		Blackboard by 11:55
	Discussion of the		p.m. the same day as
	hydrologic		your lab session
	principles underlying		5
	streamflow analysis		
	and modeling, and		
	an introduction to		
	the Amazon River in		
	Brazil		
Week 7	Rivers, Floods and	No reading	Weekly quiz in lecture
10/6	Floodplains		Lab 5 is due to
10/8	Discussion of the		Blackboard by 11:55
	role of floods and		p.m. the same day as
	floodplains in		your lab session
	hydrologic systems		, <u>-</u>
	and an introduction		
	to the Yangtze River		
	in China		

Week 8	Atmospheric and	No reading	Weekly quiz in lecture
10/13	Oceanic		Lab Gia dua ta 11.55
10/15	Circulation		n m the same day as
	The role of		p.m. the same day as
	atmospheric and		your lab session
	oceanic circulation		
	in the functioning of		
	the Earth		
Week 9	Water Quality	Davie, Ch. 7	Weekly quiz in lecture
10/20	Issues		Leb 7 is due to
10/22	Discussion of the		Blackboard by midnight
	role and importance		the same day as your lab
	of water quality and		the same day as your lab
	the likely sources of		session
	contaminants, plus		Report #1 is due to
	an introduction to		Blackboard by 11:55
	the Ganges River in		p.m. on 10/23
	India		-
Week 10	Development,	Jones, Ch. 1-2	Weekly quiz in lecture
10/27	Urbanization, and		Lab 8 is due to
10/29	Modernization		Blackboard by 11.55
	Discussion of the		p m the same day as
	role of development,		p.m. the same day as
	urbanization and		your lab session
	modernization in		
	shaping human use		
	of water resources;		
	plus the history of		
	water in Los		
	Angeles as seen		
	through <i>Cadillac</i>		
	Desert		
Week 11	Uneven Water	Hoekstra, Ch. 1-2	Weekly quiz in lecture
11/3	Access, Virtual	Jones, Ch. 3-4 & 8	
11/5	Water and Water		Dia slab a sud has 11.55
	Footprints		Blackboard by 11:55
	Exploration of the		p.m. the same day as
	connections		your lab session
	between poverty,		
	governance and		
	uneven water access.		
	and the role of		
	virtual water and		
	water footprints in		
	clarifying and		
	understanding		
	human utilization of		
	water resources		

Week 12	The Water	Hoekstra, Ch. 3-5 & 7	Weekly quiz in lecture
11/10	Footprint of	Jones, Ch. 5-7, 9, & 12-14	Lab 10 is due to
11/12	<b>Global Products</b>		Blackboard by 11.55
	Discussion of the		p = the same day as
	water footprint		p.m. the same day as
	associated with		your lab session
	various food		
	products, cotton,		
	and flowers		
Week 13	Modern Life and	Jones, Ch. 10	Weekly quiz in lecture
11/17	Climate Change		Lab 11 is due to
11/19	Exploration of the		Blackboard by 11.55
	rise in the popularity		n m the same day as
	of bottled water in		p.iii. the same day as
	the U.S. and the		your lab session
	societal and		
	scientific challenges		
	accompanying		
	climate change		
Week 14	Water Resources	Hoekstra, Ch. 6	Weekly quiz in lecture
11/24	in a Sustainable	Jones, Ch. 15-19	
	World		
	Discussion of the		
	water infrastructure		
	and use patterns that		
	will be needed to		
	build more resilient		
	and sustainable		
	communities across		
	the world		
Week 15	GeoDesign and	Jones, Ch. 20-22	Weekly quiz in lecture
12/1	<b>Class Review</b>		Lab 12 is due to
12/3	Discussion of the		Blackboard by 11:55
	ways in which		p.m. the same day as
	spatial thinking and		your lab session
	the principles of		
	geodesign might be		Report #2 is due to
	used to build a more		Blackboard no later than
	resilient and		11:55 p.m. on 12/4
	sustainable world as		
	well as a review of		
	class and lab		
	material in		
	preparation for the		
	Final Exam		
FINAL			8:00-10:00 a.m.,
			Tuesday, 15 <sup>th</sup> December
12/15			

## 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://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions. 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://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. 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 Center for Women and Men* http://www.usc.edu/student-affairs/cwm/ 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* https://dsp.usc.edu/ 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.