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: Fall 2018, Tuesdays and Thursdays, 11:00 a.m. to 12:20 p.m.

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

Co-Instructor: John P. Wilson
Office: AHF B55F
Office Hours: Tuesdays and Thursdays, 9-10 a.m. PT. Also available by appointment via email.
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Co-Instructor: Elisabeth Sedano
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Office Hours: Mondays, 12-1 p.m. and Tuesdays 2-3 p.m. PT. Also available by appointment via email.
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Contact Info: arutkows@usc.edu, 213-740-6390, http://bit.ly/andyhangout

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

Upon successful completion of this course, a student will be able to:

- Identify the special properties of water and the fundamental role it plays in the functioning of the Earth;
- Explain 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;

- Describe the ways that human behavior affects water quality and the rates and patterns of the water cycle around the world;
- Identify the integration of economic, legal, and cultural factors with physical characteristics of water that together explain current water-related issues affecting human society;
- Use spatial data and maps to perform simple analyses of water-related processes; and
- Employ basic cartographic principles and integrate spatial datasets and other digital resources to communicate the results of water-related research.

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

Required Readings and Supplementary Materials

Please acquire the text listed below. It is available at the USC Bookstore. All other supplementary readings listed in the syllabus are available online through USC Libraries or under the tab marked "Readings" on the course Blackboard.

The required textbook for this course is:

- Holden, J. (Ed.) 2013. *Water Resources: An Integrated Approach*. New York, NY: Routledge.

Supplementary readings for this course are:

- Anderson, J. 2003. The environmental benefits of water recycling and reuse. *Water Science & Technology: Water Supply* 3: 1-10.
- Anderson, M. G., & Burt, T. P. 1978. Role of topography in controlling throughflow generation. *Earth Surfaces Processes & Landforms* 3: 331-344.
- Cronon, W. 1992. A place for stories: Nature, history, and narrative. *Journal of American History* 78: 1347-1376.
- Falkenmark, M. 1986. Fresh water: Time for a modified approach. *Ambio* 15: 192-200.
- Hasler, A. D. 1947. Eutrophication of lakes by domestic drainage. *Ecology* 28: 383-395.
- Held, I. M., & Soden, B. J. 2006. Robust responses of the hydrological cycle to global warming. *Journal of Climate* 19: 5686-5699.
- Hoskstra, A. Y. 2012. The hidden water resource use behind meat and dairy. *Animal Frontiers* 2(2): 3-8.
- Hussey, K., & Pittock, J. 2012. The energy–water nexus: Managing the Links between energy and water for a sustainable future. *Ecology & Society* 17(1): 31.
- Kolpin, D. W., Furlong, E. T., Meyer, M. T., Thurman, E. M., Zaugg, S. D., Barber, L. B., & Buxton, H. T. 2002. Pharmaceuticals, hormones, and other organic wastewater contaminants in US streams, 1999-2000: A national reconnaissance. *Environmental Science & Technology* 36: 1202-1211.

- Novotny, V. 2013. Water-energy nexus: Retrofitting urban areas to achieve zero pollution. *Building Research & Information* 41: 589-604.
- Schindler, D. W. 1974. Eutrophication and recovery in experimental lakes: Implications for lake management. *Science* 184: 897-899.
- Vörösmarty, C. J., Green, P., Salisbury, J., & Lammers, R. B. 2000. Global water resources: Vulnerability from climate change and population growth. *Science* 289: 284-288.

Description and Assessment of Assignments

Students must attend all regularly scheduled lectures/in-class exercises, participate in 12 lab sessions and three online discussion forums; write six laboratory reports, five final story map project progress reports, three article summaries and one policy essay, sit for the final examination, and produce a final project called a "Story Map."

Labs

A set of 12 lab sessions is 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. Most of the work for your lab assignments will be completed during the 2-hour lab sessions, and they will be graded and returned once you have finished and uploaded your completed lab reports to Blackboard.

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.

Online Discussions

There will be three online discussions on Blackboard (Bb). The purpose of the online discussions is to build skills for close reading and critical thinking using peer-reviewed scientific articles taken from the water science literature. The discussion forums function on Bb is quite useful in this regard. In each discussion, every student will make one short post responding to the instructor's prompt(s) and then make at least two prompts responding to other students or further prompts from the instructor and/or co-instructors. Your participation in the online discussions will be *individually graded* using the gradebook feature in Bb.

Article Summaries

Throughout the semester, students will produce three summaries of articles from peer-reviewed academic journals and/or reputable press outlets (e.g., Los Angeles Times, New York

Times, ProPublica) on one or more water-related issues. Students may use these short writing assignments strategically to explore existing interests and build background knowledge for the story map project.

Policy Essay

There will be one policy essay written in response to prompts from the instructors. This assignment 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. A Story Map is an online platform that allows for the integration of digital maps with a variety of content such as 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 video feeds and 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. In this course, you will create a Story Map that integrates data on natural and social systems around the presence (or absence), quality, and movement of water on or near the Earth's surface.

Final Exam and Other Policies

The final exam is closed book. This exam will include content learned in lectures, course readings, and laboratory sessions.

No make-up opportunities will be offered for the final exam or labs, so mark the appropriate dates on your calendars! If you have a legitimate conflict, speak with one or another of the instructors as soon as possible. Also, note that there is **no credit for late assignments.**

Grading Breakdown

The table below 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 the final examination, policy essay, and final project. Assignments must be submitted as noted, typically on the appropriate Blackboard (Bb) site.

Assessment	Number	Total Points (% of Grade)
Online Discussions	3	9
Laboratory Reports	6	24
Article Summaries	3	9

Policy Essay	1	12
Story Map Progress Reports	5	5
Final Project: Story Map	1	15
Final Exam (Closed book)	1	26
Totals	20	100

Schedule

Date	Topics	Readings	Deliverables/Due Dates
Module 1 | Fundamental Properties and Key Concepts			
Week 1			
8/21	Introduction to Course		No Labs
8/23	Water Fundamentals, Part I	Holden, Ch. 1, pp. 1-5, 10-18 Vörösmarty, C.J., Green, P., Salisbury, J., & Lammers, R.B. 2000. Global water resources: Vulnerability from climate change and population growth. *Science* 289: 284-288	
Week 2			
8/28	Water Fundamentals, Part II	Holden, Ch. 1, pp. 6-10 Hoekstra, A.Y. 2012. The hidden water resource use behind meat and dairy. *Animal Frontiers,* 2(2), 3-8	Lab Report 1: Due 11:59 p.m. the day after your lab session
8/30	Global Water Cycle	Holden, Ch. 2, pp. 19-24	
Module 2 | Water Flows and Stocks			
Week 3			
9/4	Climate Variability	Holden, Ch. 2, pp. 24-39 Cronon, W. 1992. A place for stories: Nature, history, and narrative. *Journal of American History* 78: 1347-1376	No Labs (Due to Labor Day Holiday, 9/3/18) Article Summary 1: Due 11:59 p.m., 9/7/18

9/6	Climate Change	Holden, Ch. 2, pp. 40-44 Held, I.M., & Soden, B.J. 2006. Robust responses of the hydrological cycle to global warming. *Journal of Climate* 19: 5686-5699	
Week 4			
9/11	Screening of "Before the Flood"		Lab Report 2: Due 11:59 p.m. the day after your lab session
9/13	Hydrologic Pathways	Holden, Ch. 3, pp. 49-56 Anderson, M.G., & Burt, T.P. 1978. Role of topography in controlling throughflow generation. *Earth Surface Processes & Landforms* 3: 331-344	
Week 5			
9/18	River Flow	Holden, Ch. 3, pp. 57-68	Lab Report 3: Due 11:59 p.m. the day after your lab session Article Summary 2, Due 11:59 p.m., 11/21/18
9/20	River Channel Dynamics	Holden, Ch. 3, pp. 68-76	
Week 6			
9/25	Characteristics of Surface Waters	Holden, Ch. 4, pp. 79-93	Lab Report 4: Due 11:59 p.m. the day after your lab session Ungraded (but required) Policy Essay Proposal, Due 11:59 p.m., 9/27/18 Online Discussion 1 Post, Due 11:59 p.m., 9/28/18
9/27	Water Use and Water Quality Deterioration	Holden, Ch. 4, p. 93-115 Hasler, A.D. 1947. Eutrophication of lakes by domestic drainage. *Ecology* 28: 383-395	
Week 7			
10/2	Groundwater Flow Principles and Abstraction	Holden, Ch. 5, pp. 123-145	Lab Report 5: Due 11:59 p.m. the day after your lab session Online Discussion 1 Responses to Classmates' Posts, Due 11:59 p.m., 10/2/18
10/4	Groundwater Chemistry and Pollution	Holden, Ch. 5, pp. 145-157	

Week 8			
10/9	Screening of "Company Town"		Story Map Progress Report 1: Due 11:59 p.m. the day after your lab session
Module 3 | Aquatic Ecosystems			
10/11	Life in Aquatic Ecosystems	Holden, Ch. 6, pp. 161-180	Article Summary 3, Due 11:59 p.m., 10/12/18
Week 9			
10/16	Human Modification and Management of Aquatic Ecosystems	Holden, Ch. 6, pp. 180-195 Schindler, D.W. 1974. Eutrophication and recovery in experimental lakes: Implications for lake management. *Science* 184: 897-899	Story Map Progress Report 2: Due 11:59 p.m. the day after your lab session Online Discussion 2 Post, Due 11:59 p.m., 10/19/18
Module 4 | Water and Health			
10/18	Infectious Diseases	Holden, Ch. 8, pp. 223-239 Kolpin, D.W., Furlong, E.T., Meyer, M.T., Thurman, E.M., Zaugg, S.D., Barber, L.B., & Buxton, H.T. 2002. Pharmaceuticals, hormones, and other organic wastewater contaminants in US streams, 1999-2000: A national reconnaissance. *Environmental Science & Technology* 36: 1202-1211	
Week 10			
10/23	Chemical Contaminants	Holden, Ch. 8, pp. 239-249	Story Map Progress Report 3: Due 11:59 p.m. the day after your lab session Online Discussion 2 Responses to Classmates' Posts, Due 11:59 p.m., 10/23/18
10/25	Physical Water Risk	Holden, Ch. 8, pp. 249-259	
Module 5 | Water Management			

Week 11			
10/30	Water Demand Planning and Management	Holden, Ch. 7	Story Map Progress Report 4: Due 11:59 p.m. the day after your lab session Online Discussion 3 Post, Due 11:59 p.m., 11/2/18
11/1	Potable Water	Holden, Ch. 9, pp. 265-273	
Week 12			
11/6	Wastewater Treatment	Holden, Ch. 9, pp. 273-289 Anderson, J. 2003. The environmental benefits of water recycling and reuse. *Water Science & Technology: Water Supply* 3: 1-10	Story Map Progress Report 5: Due 11:59 p.m. the day after your lab session Policy Essay, Due 11:59 p.m., 11/9/18
11/8	Water-Energy Nexus	Hussey, K., & Pittock, J. 2012. The energy–water nexus: Managing the Links between energy and water for a sustainable future. *Ecology & Society* 17(1): 31 Novotny, V. 2013. Water-energy nexus: Retrofitting urban areas to achieve zero pollution. *Building Research & Information* 41: 589-604	
Week 13			
11/13	Water Economics	Holden, Ch. 10, pp. 293-314 Dalhuisen, J.M., Groot, H.I.F., and Nijkamp, P. 2000. The economics of water: A survey of issues. *International Journal of Development Planning Literature* 15: 3-20	Story Map Final Presentation (in lab session)
11/15	Screening of "Mullholland's Dream"		
Module 6 | Future Prospects			
Week 14			
11/20	Water Rights, Law, and Governance	Holden, Ch. 11	No Labs and Thursday Class (Due to

		Falkenmark, M. 1986. Fresh water: Time for a modified approach. *Ambio* 15: 192-200	Thanksgiving Day Holiday, 11/22/18)
Week 15			
11/27	Virtual Water, Water Footprints, and the Future of Water	Holden, Ch. 12, pp. 333-347	Lab Report 6: Due 11:59 p.m. the day after your lab session
11/29	Final Exam Review		Online Discussion 3 Post, Due 11:59 p.m., 11/28/18 Online Discussion 3 Responses to Classmates' Posts, Due 11:59 p.m., 11/30/18
	Final Examination (8:00 a.m. to 10:00 a.m., Tuesday, December 11, THH 102; Closed Book)		

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 Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/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.

Support Systems

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support
Incidents of bias, hate crimes and micro-aggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.
Provides overall safety to USC community. dps.usc.edu