

## **SSCI 265Lg, The Water Planet**

### *Syllabus*

**Units:** 4

**Term — Day — Time:** Fall 2017, 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

**Regular Office Hours:** Tuesdays, 9-10 a.m. and Fridays, 2-3  
p.m. PT. Also available by appointment via email.

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**Co-Instructor:** Elisabeth Sedano

**Office:** AHF B57C

**Regular Office Hours:** Mondays, 12-1 p.m. and Thursdays 1-  
2 p.m. PT. Also available by appointment via email.

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**Office:** VKC B40C

**Office Hours:** By appointment

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## **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 the 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 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:

- Gleick, P. H. 2011. *Bottled and Sold: The Story Behind Our Obsession with Bottled Water*. Washington, DC: Island Press.
- Hoekstra, A. Y. 2013. *The Water Footprint of Modern Consumer Society*. New York, NY: Routledge.
- Jones, J. A. A. 2010. *Water Sustainability: A Global Perspective*. New York, NY: Routledge.

- Willems, W. J. H. and van Schaik, H. (Eds.) 2015. *Water & Heritage: Material, Conceptual and Spiritual Connections*. Leiden, The Netherlands: Sidestone Press.

## **Description and Assessment of Assignments**

Students must attend all regularly scheduled lectures/in-class exercises, participate in labs, write two policy essays, sit for four in-class quizzes and the midterm and final examinations, 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. Most of the preparatory 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.

### **Class Participation / Weekly Quizzes**

There will be four quizzes in which students will be quizzed on the concepts, ideas, and case studies up until the date of each quiz. These quizzes will be given at the beginning or end of either the Tuesday or Thursday class at approximately equal intervals throughout the semester. The first quiz will be offered no sooner than the third week of classes and the last one will be offered no later than Week 14.

**Absences from class sessions** must be requested by sending an email to both of the class instructors. Excused absences from class sessions will be granted only for valid reasons; please notify us of the reason for your absence in your email.

### **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 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.

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 treasures 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 natural and social 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](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***

The four weekly quizzes and both the midterm and final exams are closed book. The weekly quizzes and midterm and final exams 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 appropriate instructor as soon as possible. Also, note that there is **no credit for late assignments**. The date and time for the midterm and final exams are listed in the Course Schedule below.

## 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 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)	4	8
Laboratory Reports (Submit all lab reports via Bb no later than 11:55 p.m. on the next weekday following your lab session)	7	14
Policy Essays (Submit in class & on Lecture Bb)	2	16
Midterm Exam (Closed book)	1	16
Final Exam (Closed book)	1	30
Final Project: Story Map (Submit URL to Bb) and give oral report	1	16
<b>Totals</b>	<b>23</b>	<b>100</b>

## Schedule

Date	Topics	Readings	Deliverables/Due Dates
<b>Week 1</b>			
8/22	[Wilson] Introduction to Course; Special Properties of Water and Global Water Distribution	Holden, Ch. 1,	No deliverables. Labs do not meet this week.
8/24	[Sedano] Introduction to Water in Society	Willems & van Schaik, Ch. 2-3	
<b>Week 2</b>			
8/29	[Wilson] The Water Cycle	Holden, Ch. 2, p. 19-24	Lab #1 is due in Bb by 11:55 p.m. on the next weekday following your lab session
8/31	[Wilson] Watersheds and Water Balance	Holden, Ch. 3, p. 49-66	

<b>Week 3</b>			
9/5	[Wilson] River Dynamics and Flooding	Holden, Ch. 3, p. 66-78	No deliverables. Labs do not meet this week.
9/7	[Wilson] Surface Water Chemistry	Holden, Ch. 4, p. 79-92	
<b>Week 4</b>			
9/12	[Sedano] Urban, Industrial, and Agricultural Water Use	Holden, Ch. 4, p. 93-122	Lab #2 is due in Bb by 11:55 p.m. on the next weekday following your lab session
9/14	[Sedano] Regulation and Management of Water Use	Holden, Ch. 4, p. 93-122	
<b>Week 5</b>			
9/19	[Wilson] Groundwater and Groundwater Modelling	Holden, Ch. 5, p. 123-138	Lab #3 is due in Bb by 11:55 p.m. on the next weekday following your lab session
9/21	[Sedano] Groundwater Pollution and Regulation	Holden, Ch. 5, p. 138-160	
<b>Week 6</b>			
9/26	[Wilson] Aquatic Ecosystems	Holden, Ch. 6, p. 161-180	Lab #4 is due in Bb by 11:55 p.m. on the next weekday following your lab session
9/28	[Sedano] Human Alterations to Aquatic Ecosystems	Holden, Ch. 6, p. 180-201	
<b>Week 7</b>			
10/3	[Wilson] Atmospheric and Oceanic Circulation	Holden, Ch. 2, p. 19-24	Lab #5 is due in Bb by 11:55 p.m. on the next weekday following your lab session
10/5	[Wilson] Modelling Climate Change	Holden, Ch. 2, p. 24-42	
<b>Week 8</b>			
10/10	[Sedano] Impacts of Climate Change	Holden, Ch. 2, p. 42-48	Lab #6 is due in Bb by 11:55 p.m. on the next weekday following your lab session  10/12: Midterm Exam to be held in class, 11:00 a.m. to 12:20 p.m. Closed book.
10/12	<b>Midterm Exam</b>		

<b>Week 9</b>			
10/17	[Sedano] Urban Water Provision	Gleick, Ch. 1; Holden, Ch. 7	Lab #7 is due in Bb by 11:55 p.m. on the next weekday following your lab session  10/20: Policy Essay #1 due to Bb by 5:00 p.m.
10/19	[Wilson] Water and Health	Holden, Ch. 8	
<b>Week 10</b>			
10/24	[Wilson] Potable Water and Water Treatment	Holden, Ch. 9	Lab: Story Map Week #1 Report due to Bb by 11:55 p.m. on the next weekday following your lab session
10/26	[Sedano] Bottled Water	Gleick, Ch. 2-3	
<b>Week 11</b>			
10/31	[Sedano] Water as a Property	Holden, Ch. 10	Lab: Story Map Week #2 Report due to Bb by 11:55 p.m. on the next weekday following your lab session
11/2	[Sedano] Water as a Right	Holden, Ch. 11	
<b>Week 12</b>			
11/7	[Sedano] The Concept of the Water Footprint	Holden, Ch. 12	Lab: Story Map Week #3 Report due to Bb by 11:55 p.m. on the next weekday following your lab session
11/9	[Sedano] Water in the Life Cycle Assessment Model	Holden, Ch. 11	
<b>Week 13</b>			
11/14	[Sedano] Increasing Problem of Diminishing Water Supplies (I)	Jones, Ch. 2, 3, & 5	Lab: Story Map Week #4 Report due to Bb by 11:55 p.m. on the next weekday following your lab session  11/17: Policy Essay #2 due to Bb by 5:00 p.m.
11/16	[Sedano] Increasing Problem of Diminishing Water Supplies (II)	Jones, Ch. 2, 3, & 5	
<b>Week 14</b>			
11/21	[Wilson] Water Management: How Can Geodesign Contribute?	Davie, Ch. 8	No deliverables.
11/23	Thanksgiving Holiday (No Class)		
<b>Week 15</b>			



11/28	[Wilson] Water Management: How Can Science Contribute?	Jones, Ch. 1	Oral Story Map presentation in lab session and final Story Map report with URL due before the start of your lab session
12/1	[Sedano] Final Exam Review		
12/12	<b>Final Examination (8:00-10:00 a.m., THH 102; Closed Book)</b>		

## 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” <https://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. <https://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. <http://www.suicidepreventionlifeline.org>.

*Relationship & 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. <https://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: <http://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. <https://equity.usc.edu/>.

*Bias Assessment Response and Support*

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>.

*Student Support & Advocacy – (213) 821-4710*

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. <https://studentaffairs.usc.edu/ssa/>.

*Diversity at USC – <https://diversity.usc.edu/>*

Tab for Events, Programs and Training, Task Force (including representatives for each school), Chronology, Participate, Resources for Students.

### ***Resources for Online Students***

The Course Blackboard page and the GIST Community Blackboard page have many resources available for distance students enrolled in our graduate programs. In addition, all registered students can access electronic library resources through the link <https://libraries.usc.edu/>. Also, the USC Libraries have many important resources available for distance students through the link: <https://libraries.usc.edu/faculty-students/distance-learners>. This includes instructional videos, remote access to university resources, and other key contact information for distance students.