Spatial Sciences Institute
University of Southern California

SSCI 265Lg: THE WATER PLANET

(Fall Semester 2014)

1. Introduction

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 IV (Science and Its Significance). 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 and analytical techniques 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.

2. Course Outline

The course will be organized around the following lecture and laboratory topics.

8/26: Introduction to Class | Special Properties of Water
8/28: The Hydrologic Cycle

Read Davie Chapter 1 (pp. 1-13)

9/2: The Amazon River: Pristine and Unprotected
9/4: The Yangtze River: China's Wild Lifeline

9/9: Development and Modernization
9/11: Maps, Models, Storytelling, and More!

Read Hoekstra Chapter 1 (pp. 1-12)

9/16: Drinking Ten Bathtubs of Water per Day
9/18: Precipitation

Read Davie Chapter 2 (pp. 14-35) and Hoekstra Chapter 2 (pp. 13-27)

9/23: Evaporation
9/25: Storage

Read Davie Chapters 3 and 4 (pp. 36-77)

9/30 Ground Water
10/2: Runoff

Read Davie Chapter 5 (pp. 78-100)

10/7: Rivers and Fluvial Processes
10/9: Streamflow Analysis and Modeling

Read Davie Chapter 6 (pp. 101-124)

10/14: Water for Bread and Pasta
10/16: The Meat Eater, a Big Water User

Read Hoekstra Chapters 3 and 4 (pp. 28-59)

10/21: How Our Cotton Clothes Link to a Disappearing Sea
10/23: Burning Water: The Water Footprint of Biofuels

Read Hoekstra Chapters 5 and 6 (pp. 60-87)

10/28: Floods and Floodplains
10/30: Atmospheric and Oceanic Circulation

Read Davie Chapter 5 (pp. 78-100)

11/4: The Overseas Water Footprint of Cut Flowers
11/6: Cadillac Desert: The American West and Its Disappearing Water

Read Hoekstra Chapter 7 (pp. 88-102)

11/11: Oceans, Seawater, and Salinity
11/13: Water Quality

Read Davie Chapter 7 (pp. 125-150)

11/18: The Ganges: Sacred and Sullied
11/20: Tapped

Hoekstra Chapters 8, 9, and 10 (pp. 103-138)

11/25: Climate Change
11/27: Thanksgiving Recess

Read Davie Chapter 8 (pp. 151-174) and Hoekstra Chapters 11 and 12 (pp. 139-162)

12/2: Water Sustainability: How Can GeoDesign Contribute?
12/4: Class Review

Read Hoekstra Chapters 13 and 14 (pp. 163-183)

12/16: Final Examination (8:00-10:00 a.m.)

3. Important Dates

8/25:	Fall semester classes begin
9/1:	Labor Day, university holiday
9/12:	Last day to register and add classes; last day to change enrollment option to Pass/No Pass or Audit; last day to drop a class without a mark of "W" and receive a 100% refund
11/14:	Last day to drop a class with a mark of W
11/26-29:	Thanksgiving recess, university holiday
12/5:	Fall semester classes end
12/6-9:	Study days
12/16:	Final examination (8:00-10:00am)

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 lectures. Your weekly laboratory assignments will be graded and returned, and the final exam will have a laboratory component to it. In other words, the laboratory component is important.

No make-up opportunities 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.

4. Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions can be found at: http://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

5. Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. More information about academic accommodations based on a disability can be found at: http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to an instructor as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

6. Course Personnel

Instructors:

Dr. John P. Wilson
AHF B55E
213-740-1908
jpwilson@usc.edu

Wednesdays 9:00-10:00 a.m., Fridays 9:00-10:00 a.m., or by appointment

Dr. Daniel Warshawsky
AHF B55B
213-740-2876
warshaws@usc.edu

Mondays 9:00-10:00 a.m., Thursdays 1:00-2:00 p.m., or by appointment

Dr. Lisa Sedano
AHF B56A
213-740-5910
sedano@usc.edu

Tuesdays 1:00-2:00 p.m., Thursdays 1:00-2:00 p.m., or by appointment

7. Grading Scheme

Class Reports (2 x 4 points per report)	8%
Weekly Quizzes (14 x 2 points per quiz)	28%
Laboratory Assignments (7 x 2 points per assignment)	14%
Laboratory (Story Map) Project (with multiple components)	20%
Final Examination (12/16/14)	30%

8. Textbooks

Required Texts:

Davie T (2008) *Fundamentals of Hydrology* (Second Edition). New York, Routledge

Hoekstra A Y (2013) *The Water Footprint of Modern Consumer Society*. New York, Routledge

Recommended Texts:

Cech T V (2010) *Principles of Water Resources: History, Development, Management, and Policy* (Third Edition). New York, John Wiley and Sons

De Villiers M (2001) *Water: The Fate of Our Most Precious Resource*. New York, First Mariner Books

Jones J A A (2010) *Water Sustainability: A Global Perspective*. London, Hodder Education

Leopold L B (1997) *Water, Rivers and Creeks*. Sausalito, CA, University Science Books

Pennington K L and Cech T V (2010) *Introduction to Water Resources and Environmental Issues*. New York, Cambridge University Press

Reisner M (1993) *Cadillac Desert: The American West and Its Disappearing Water*. New York, Penguin Books

Young M D and Esau C (eds) (2013) *Investing in Water for a Green Economy: Services, Infrastructure, Policies and Management*. New York, Routledge

9. Laboratory Topics and Protocols

The lab experiences will be organized around the topics listed below. The dates shown to the left of the individual topics indicate the first day of the week (i.e. the Monday) on which these labs start.

9/8: Groundwater for Many People: The Spatial Characteristics of a Shared Resource
9/15: Precipitation Measurement and Analysis
9/22: Planning for Drought: Monitoring Reservoir Evaporation
9/29: Water Balance Tables
10/6: Runoff Measurement and Analysis
10/13: Predicting One-Year Floods
10/20: Hurricane Katrina: Understanding Physical and Social Vulnerability
10/27: Story Map Projects: Requirements (Proposal Due)
11/3: Story Map Projects: In Class Work (Report Due)
11/10: Story Map Projects: In-Class Work
11/17: Story Map Projects: In Class Work
12/1: Story Map Projects: Presentations (Final Story Map Products Due)

Each of the lab sessions will start on the hour with a brief introduction. These introductions will take no longer than 10 minutes and students arriving more than 10 minutes after the scheduled start times for their laboratory sessions will be turned away and assigned a zero grade for that particular lab assignment. No lab reports will be accepted for grading if handed in outside of the regularly scheduled lab session. One or other of two different kinds of tasks will be completed during the lab sessions, as explained below.

First, you will work on self-guided work tasks using specialized geographic analysis tools and one or more water-related geospatial datasets during the first seven lab sessions. These tasks should take approximately 75 minutes to complete after which time Dr. Sedano will convene a 15 minute roundtable discussion of what you have done, what it means, and how these tasks might have been varied and/or enhanced if performed by professionals in a real-world setting. The final 15 minutes of this series of lab sessions will be available for each of you to prepare and submit your final lab report for grading.

For the second series of tasks, you will work on your story map projects 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, video clips, 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.