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/Environmental Studies 128
Water Resources Management
Spring 2016

Class Hours:

ENVS 128-01 (22232)	Water Res Mgt (Lecture)	25	We 3:00PM - 5:45PM	Clark Building 234	Jan 28, 2016- May 16, 2016

Instructor: Patrick T. Ferraro

Office Hours: **Mondays & Wednesdays 12:00 - 1:00 PM**
Room WSQ 115A

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Catalog Course Description:

ENVS 128 Water Resource Management

Description
Water uses and supplies; water resource measurement methods; hydrology; erosional processes; sediment production and transport particularly on Northern California coastal watershed; flood hazards and methods of control; groundwater and groundwater aquifers; water quality. Prerequisite: EnvS 129 and STAT 95.

Grading
Normal Grade Rules

Units
3
Course Format:
Students are expected to have completed reading assignments prior to class. Lecture will be supplemented with audio-visual media. A portion of each class will be spent as interactive discussion between instructor and students. Experts may be invited to some of the classes to augment the instructor's expertise. Field trips will be scheduled as time permits.

Course Text:

With the multitude of topics and levels used to approach these subjects, one suitable textbook trying to cover the entire course is limited to prior application of public policy to water management and *visa versa*. Many reading assignments will be internet based and your only cost will be your time and access portal. The campus has computers for use by all students with and without personal/portable IT technology

Readings from pertinent Internet web sites will be assigned for each class topic. Students will be encouraged to search and review related links to supplement the information provided on the assigned sites and use the information to help generate discussions in the classroom.

The following printed materials are recommended and available for purchase at Amazon.com and for use in the MLK library in the reserve section:

Cech, Thomas V. 2005. *Principles of Water Resources: History, Development, Management and Policy, 3rd.* John Wiley and Sons Inc., Hoboken, NJ.
Hardcover: 576 pages (August 24, 2009)
*** ISBN-10: 0470136316**
- **ISBN-13: 978-0470136317**

Preview book at Google Books:

http://books.google.com/books?id=A2nJCPPixGQC&pg=PP5&lpg=PP5&dq=Cech,+Thomas+V.+2005.+Principles+of+Water+Resources:+History,+Development,+Management+and+Policy,+3rd.+John+Wiley+and+Sons+Inc.,+Hoboken,+NJ.&source=bl&ots=wnrQcfK62T&sig=45QTEcZaWY9Eh

Amazon.com link:
http://www.amazon.com/Principles-Water-Resources-Development-Management/dp/0470136316/ref=sr_1_fkmr1_1?ie=UTF8&qid=1295210387&sr=8-1-fkmr1

Water 4.0: The Past, Present, and Future of the World's Most Vital Resource
Hardcover *– January 28, 2014 (paperback available until April 1,2015)*
by David Sedlak (Author)
Amazon.com link:
http://www.amazon.com/Water-4-0-Present-World's-Resource/dp/030017649X/ref=pd_rhf_ee_s_qp_4_DWH2?ie=UTF8&refRID=1BC5M6VSJJK9YTDPC6J2

Water Resources Managment EnvS 128

Patrick T. Ferraro, Instructor

Syllabus

Course Web Page: https://sites.google.com/site/envs128sp2016watermanagement/
Water resources management is a multi-disciplinary field encompassing:

- water supply reliability
- urban vs. agricultural water supply
- urban and regional planning
- water quality for public health and the environment
- watershed management
- environmental restoration
- flood control
- wastewater treatment
- energy (and thus carbon emission) impacts of human engineered water systems
- anticipating and responding to climate change

This course will give you exposure to both quantitative and qualitative aspects of the topic using a variety of teaching techniques including lectures, group discussion, problem sets, guest lectures, and a field trip. We will look at case studies within California, the US and internationally. We will also evaluate how climate change has already impacted water resources in some regions of the world and how it is expected to change California water management.

Over the semester, you will:

- gain a working familiarity of major aspects of water resources management
- (e.g., hydrology, water pollution, irrigation);
- hear from professionals working in the field about "on the ground" issues;
- have an opportunity to explore a water resources management topic of personal interest; and
- practice communicating (both orally and in writing) your findings to others.

Generally, we will meet twice weekly for lectures, in-class exercises, case studies, and discussion. Outside of class homework assignments will include completing course readings and being prepared to discuss course materials, conducting web-based research, writing short essays, leading class discussions, completing problem sets, and working in small groups.

Grading

- 10% Classroom participation/ discussion of internet articles on topics of the week.
- 40% Nine (9) take-home problem sets will be given about a week apart. Each set will be 5%, but your lowest score will be tossed.
- 25% Research Report - Each students will write term report on a current local water issue. Suggested topics will be provided, but students may select a topic not listed.
  Please download rubric at:
  https://sites.google.com/site/envs128sp2016watermanagement/home/research-assignment-rubric
  • RESEARCH TOPIC ABSTRACTS are due on Mar. 2, 2016
  • DRAFT TERM PAPER DUE *April 27, 2016, 11:59PM*
  • *FINAL DRAFT DUE MAY 11, 2016*
  Written submittals must follow paper requirements. (See below)
- 25% Final Exam. Take-home exam will be given two weeks prior to final class meeting and due on day of final scheduled meeting.

At SJSU, students are expected to spend at least two hours outside of class for every one hour of in-person class time. Because this is a three-unit course, you can expect to spend a minimum of **6 hours per week** completing class-related assignments in addition to the in-person class meetings. Assignments include weekly readings, problem sets, research and writing term report. These assignments may require work beyond the minimum 6-hours of work outside the classroom. Careful time management will help you keep up with readings and assignments and enable you to succeed in all your classes.

Writing for EnvS 128 and use of other sources

SJSU policy prohibits representing the work of another as your own. You must give appropriate credit through quotation and citation whenever you use the work of another. For footnotes, they can be at the end of the page, or the end of the paper. Any significant source, even if not quoted, should be listed in the paper. It is not appropriate

to turn in a paper that is a collection of quotes; instead the vast majority of the paper should be your own writing.

Disabilities Policy

It is the policy of San Jose State University to provide appropriate accommodations to students who have documented disabilities meeting the eligibility requirements of the Americans With Disabilities Act of 1990. This website provides information on how students need to document disabilities:
http://www.drc.sjsu.edu/student_services/document_disability.htm

All SJSU Policies currently posted in the university catalogue are applicable:
http://info.sjsu.edu/static/catalog/policies.html

Water Resources Management

EnvS 128

Patrick T. Ferraro, Instructor

Lecture	***Date***	***Lecture Content***	***Assignments & Recommended Text Chapters*** ***(due BEFORE class)***
	5/20/16	**Final Exam, CLARK HALL, RM 234**	**12:15 – 2:30 PM**
1	2/3/16	Introductions & course overview	
2	2/3/16	Managing Water by Watersheds	Problem Set #1 assigned; Chapters 1 (Historical Perspectives of Water Use and Development) AND 2 (The Hydrologic Cycle, Climate, and Weather)
3	2/10/16	Semester Case Study: Coyote Creek	Chapter 3 (Surface Water Hydrology) Problem set #2 assigned
4	2/10/16	Historical Ecology/Stream and Wetlands \Baseline Water Requirement	Chapter 12 (Water, Fish and Wildlife); **Assignment #1 due.**
5	2/17/16	Watershed /Groundwater Connection	Chapter 4 (Groundwater Hydrology) **Problem set #2 due.**

Lecture	*Date*	*Lecture Content*	*Assignments & Recommended Text Chapters* *(due BEFORE class)*
6	2/17/16	Surface Water Impoundments	Problem set #3 assigned.
7	2/24/16	Artificial Recharge with Reservoir Supplies	Ch 7 (Dams)
8	2/24/16	Groundwater Extraction/Overdrafts/Subsidence	
9	3/2/16	Economics & Agricultural Water Demand	Chapter 13 (Economics of Water) ; Problem set #4 assigned
10	3/2/16	Urban Water Demand Projections	Ch 6 (Muni Water Development and Irrigation) **Problem set #3 due**
11	3/9/16	Inter-basin Transfers/Importing Water	Problem set #5 assigned
12	3/9/16	Drinking Water Quality	**Problem set #4 due**
13	3/16/16	Water Treatment/Desalination	**Problem set #5 due** Chapter 11 (Drinking Water and Wastewater Treatment)
14	3/16/16	Urban Water Distribution	Problem set #6 assigned
15	3/23/16	Improving Water Use Efficiency	
16	3/23/16	Sewage: Generation & Transmission	**Problem set #6 due** Problem set #7 assigned
17	4/6/16	Urban Stormwater & Pollution Prevention	Chapter 5 (Water Quality)
18	4/6/16	Grey Water Generation and Reuse, Rainwater Harvesting	**Problem set #7 due**

Lecture	*Date*	*Lecture Content*	*Assignments & Recommended Text Chapters (due BEFORE class)*
19	4/13/16	Sewage Treatment & Disposal	Problem set #8 assigned
20	4/13/16	Water Recycling and Reuse	
21	4/20/16	Sediment Transport, Deposition and Tidelands FIELD TRIP: Coyote Creek Outdoor Classroom, located at 791 E. William St, in San Jose, between 16th & Bridge, across from the Williams Street Park.	DRAFT TERM PAPER DUE
22	4/20/16	Flood Protection: Land Use Controls, Riparian Setbacks, FEMA Flood Insurance Program, Levees and Bypass Channels	**Problem set # 8 due** Problem set #9 assigned
23	4/27/16	Flood Frequency Hydrology	
24	4/27/16	Climate Change/Sea Level Rise	Chapters 14 (Water Use Conflicts); **Problem set #9 due**
25	4/27/16	Sacramento-San Joaquin Delta & New Convenience	
26	5/4/16	Hydroelectric Power Generation	
27	5/4/16	Integrated Water Resources Planning	Chapter 15 (Emerging Water Issues)
28	5/4/16	Sustainability and Carbon Footprints	
29	5/11/16	Student Presentations	Final Draft of Term Report Due

Greensheet and class lectures notes will be posted on the following web site:
https://sites.google.com/site/envs128sjsufall2015/

Reading Assignments
EnvS 128 Water Resources Management
Patrick T. Ferraro, Instructor

This reading list will be supplemented throughout the semester with documents posted on the class web site:
https://sites.google.com/site/envs128sp2016watermanagement/home

Please check this web site prior to each class and read attached documents. Lecture notes containing video and additional web links will be posted after each class meeting.

Class Schedule	Topic/Online reading assignments
1. February 3	Introductions/ Overview of Class

Two Visions of the Fourth Revolution in Urban Water - David Sedlak
https://www.youtube.com/watch?v=KmR2EWohrCg - t=23 (45:00)

Panel 1A: David Sedlak, UC Berkeley "Water, Cities, and Infrastructure: Innovations in Technology and Affordability."

https://www.youtube.com/watch?v=eGTfojoBYa4 (23:12)

Los Angeles, City of Water By JACQUES LESLIEDEC. 6, 2014
http://www.nytimes.com/2014/12/07/opinion/sunday/los-angeles-city-of-water.html?_r=2

2. February 3 — Managing Water by Watersheds
Thinking Globally: Water Distribution
OVERPOPULATION crisis part 1 of 2
http://www.youtube.com/watch?v=HhuQfxHBTzg&feature=related

video labeled ***The Most IMPORTANT Video You'll Ever See***
"Arithmetic, Population and Energy" by Prof. Bartlett, Univ. of Colorado (part 1 of 8)
http://www.youtube.com/watch?v=F-QA2rkpBSY&feature=channel
Click on Playlist in side bar for parts 2-8
http://www.youtube.com/watch?v=Pb3JI8F9LQQ&feature=list_related&playnext=1&list=PL6A1FD147A45EF50D
Water cycle

http://en.wikipedia.org/wiki/Water_cycle

3. February 10 Semester Case Study: Coyote Creek

South Bay Restoration/The Mouth of the Coyote:

California Colloquium on Water
Steve Ritchie, Executive Project Manager, South Bay Salt Pond Restoration Project

"The South Bay Salt Pond Restoration Project: The Wild Heart of Silicon Valley" In 2003, the State of California and the U.S. government, with substantial support from private foundations, purchased 15,100 acres of salt production ponds adjoining South San Francisco Bay from Cargill Corporation. These ponds represent an incredible opportunity for shoreline habitat restoration and public access in the San Francisco Bay Area. This is the largest habitat restoration project in the Western U.S. (http://www.southbayrestoration.org/) and it must be accomplished without increasing flood risk...
http://www.youtube.com/watch?v=pw6UCK80ykw&feature=channel

Guide to San Francisco Bay Area Creeks
Coyote Creek Watershed
http://museumca.org/creeks/1390-OBCoyote.html

4. February 10 Historical Ecology/Stream and Wetlands Baseline Water Requirement

Coyote Creek Watershed Historical Ecology Study
http://www.sfei.org/coyotecreek
Use links on page to Download Executive Summary: and/or Full Report:

Federal Law:
United States Department of Agriculture, Natural Resources Conservation Service/Watershed Program http://www.nrcs.usda.gov/Programs/watershed/

http://en.wikipedia.org/wiki/Watershed_Protection_and_Flood_Prevention_Act_of_1954

5. February 17 Watershed /Groundwater Connection

U.S. Geological Survey Open File Report 93-643
What is Ground Water? http://water.usgs.gov/ogw/gwsw.html

Download Circular 1886: ***Sustainability of Groundwater Resources***

http://pubs.usgs.gov/circ/circ1186/pdf/circ1186.pdf

Flow and Storage in Groundwater Systems, Alley, et al., Science 14 June 2002
http://www.sciencemag.org/content/296/5575/1985.abstract

Examples of Innovative Approaches that Contribute to Ground-Water Sustainability http://water.usgs.gov/pubs/circ/circ1186/html/boxg.html

Ground Water Depletion Across the Nation
http://water.usgs.gov/pubs/fs/fs-103-03/JBartolinoFS(2.13.04).pdf

Video: How a Water Well is Drilled
https://www.youtube.com/watch?v=8K6V450StO4 (10:00)

6. February 17 Surface Water Impoundments

Water Supply Forecasts:
http://www.wcc.nrcs.usda.gov/wsf/
http://www.wcc.nrcs.usda.gov/factpub/wsf_primer.html

US Water Use by category:
http://water.usgs.gov/pubs/circ/2004/circ1268/htdocs/text-total.html
http://pubs.usgs.gov/circ/2004/circ1268/htdocs/table07.html

Dams in the Coyote Creek Watershed:

http://valleywater.org/Services/CoyoteDamAndReservoir.aspx
http://valleywater.org/Services/AndersonDamAndReservoir.aspx

SCVWD real time data:
http://www.valleywater.org/Services/Alert.aspx

7. February 24 Artificial Recharge with Reservoir Supplies

Artificial Recharge (Resource page)
http://water.usgs.gov/ogw/artificial_recharge.html

What is Aquifer Storage & Recovery?
http://sofia.usgs.gov/sfrsf/rooms/hydrology/ASR/

Groundwater Supply in Santa Clara County
http://www.valleywater.org/Services/GroundwaterSupply.aspx

Video: Groundwater Management-Santa Clara Valley Water District
https://www.youtube.com/watch?v=NgWx2IrqlVk (8:50)
Video: Groundwater: Our most reliable water source
SCVWD Valley Water https://www.youtube.com/watch?v=n3d7nkwwsCc (5:07)

Kern Water Bank/Monterey Agreement
http://www.indybay.org/newsitems/2010/01/02/18634125.php

8. February 24 Groundwater Extraction/Overdrafts/Subsidence

USGS Groundwater Information Pages
http://water.usgs.gov/ogw/ (Resource page)

Subsidence
http://www.valleywater.org/Services/LandSubsidence.aspx

Depth-to-Water Index Well Hydrographs
http://www.valleywater.org/Services/DepthToWaterIndexWellHydrographs.aspx

9. March 2 Economics & Agricultural Water Demand

Economics Primer:

Price elasticity of demand
http://en.wikipedia.org/wiki/Price_elasticity_of_demand

Video Links:
Price Elasticity of Demand - part 1
http://www.youtube.com/watch?v=MNiEHvw6TTg

Price Elasticity of Demand - part 2
http://www.youtube.com/watch?v=DB6rmbAegvE&NR=1

Subsidizing Local Food Production, Not Just Farmers
http://neverthirstpatferraro.blogspot.com/2008/06/subsidizing-local-food-production-not.html

State of Thirst: CALIFORNIA drought = food decline, **Mar 1, 2014**
https://www.youtube.com/watch?v=s_bqPVU0LWM (14:57)

State of Thirst: California's Water Future - KQED QUEST (Full Version)
https://www.youtube.com/watch?v=panaJZaffYk (26:54) **Jul 11, 2008**

10. March 2 Urban Water Demand and Projections
Population History:
Population Explosion - ECU #156
http://www.youtube.com/watch?v=WmEosykOesE&feature

OVERPOPULATION crisis part 2 of 2 Steven Hawking (10:02)
http://www.youtube.com/watch?v=-GRzatTQEgQ&feature=related

Video: Water Sensitive Urban Design
https://www.youtube.com/watch?v=b_DTnOzYTR4 (4:15)

Video: Highlights: Water Policy and Water Myths in California: Drought Edition https://www.youtube.com/watch?v=RIb-zVXyI5E (3:50)

Full Version: Water Policy and Water Myths in California: Drought Edition, Lecture By Jeffrey Mountm PhD
https://www.youtube.com/watch?v=bNF041j9QwI (1:05:37)

11. March 9 Interbasin Transfers/Importing Water
Hetch Hetchy Water Project

Temples of Water
http://neverthirstpatferraro.blogspot.com/2008/08/temple-of-water.html

State Water Project Slideshow:
http://www.watereducation.org/topic-state-water-project

South Bay Aqueduct
http://en.wikipedia.org/wiki/South_Bay_Aqueduct

Central Valley Project/San Felipe Division
http://neverthirstpatferraro.blogspot.com/2008/06/effluent-for-affluentinside-poop-on-san.html

12. March 9 Water Quality

How Clean IS Clean?
http://neverthirstpatferraro.blogspot.com/2008/06/how-clean-is-clean.html

Chlorine by products:
http://www.southerndatastream.com/thm/index.html - Introduction

California pesticide use swings up after four-year decline, DPR Jan. 3, 2012
http://westernfarmpress.com/government/california-pesticide-use-swings-after-four-year-decline?NL=WFP-01&Issue=WFP-01_20120103_WFP-01_659&YM_RID=rhellmann@brwncald.com&YM_MID=1282249

13. March 16 Water Treatment/ Desalination

Desalination/Pacific Institute Analysis: (1:14:05)
http://www.youtube.com/watch?v=HFvyxwzADd0&feature=channel

A Look Inside the Largest Desalination Plant in the Western Hemisphere

- by Laura Bliss@mslaurabliss Dec 16, 201

http://www.citylab.com/tech/2015/12/a-look-inside-the-largest-desalination-plant-in-the-western-hemisphere/420501/

Innovations in Clean Water Technology: Desalination (59:27)
Massachusetts Institute of Technology Professor Lienhard explains the different types of desalination and the recent developments that make this technology so promising.
https://www.youtube.com/watch?x-yt-cl=85027636&x-yt-ts=1422503916&v=_5UkDWGoPJ4

14. March 16 Urban Water Demand & Distribution

Milpitas council approves controversial water rate hike

By Ian Bauer, Milpitas Post
Posted: 12/17/2015
http://www.mercurynews.com/milpitas/ci_29263326/milpitas-council-approves-controversial-water-rate-hike

The answer to our readers' biggest water question: What does it cost?

By Lance Williams / December 21, 2015

https://www.revealnews.org/article/the-answer-to-our-readers-biggest-water-question-what-does-it-cost/?utm_source=Reveal%20Newsletters&utm_campaign=f132ecea8e-The_Weekly_Reveal_12_24_15&utm_medium=email&utm_term=0_c38de7c444-f132ecea8e-229943185

Every Flush You Take Silicon Valley is watching your water habits. That's probably a good thing
https://medium.com/backchannel/conserving-water-with-software-and-shame-3a846c01b811

http://galileo.phys.virginia.edu/classes/605.ral5q.spring04/lectures/water_distribution.pdf

Gold and Water in Them Thar Hills
http://neverthirstpatferraro.blogspot.com/2008/09/flow-movie.html

15. March 23 Improving Water Use Efficiency

CA Urban Water Conservation Council:

BMP 1: Utility Operations Tools
http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-1-Utility-Operations-Programs

BMP 2: EDUCATION PROGRAMS
http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-2-Education-Programs

BMP 3: RESIDENTIAL
http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-3-Residential

BMP 4. COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL
http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-4-Commercial-Industrial-and-Institutional

BMP 5. LANDSCAPE
http://www.cuwcc.org/Resources/Memorandum-of-Understanding/Exhibit-1-BMP-Definitions-Schedules-and-Requirements/BMP-5-Landscape

Price of Water: A Comparison of Water Rates, Usage in 30 U.S. Cities, 4/26 10
http://www.circleofblue.org/waternews/2010/world/the-price-of-water-a-comparison-of-water-rates-usage-in-30-u-s-cities/

16. March 23 Sewage: Generation & Transmission

Typical Sanitary Sewer Design Manual
http://www.ci.lancaster.oh.us/dept/waterpollution/pdf/specifications/Sanitary Sewer Design Manual.doc

Environmental group to sue San Jose for sewage spills and trash pollution
By Paul Rogers 11/25/2014
http://www.contracostatimes.com/breaking-news/ci_27005457/environmental-group-sue-san-jose-sewage-spills-and

17. April 6 Urban Stormwater & Pollution Prevention

Stormwater management: the basics
https://www.youtube.com/watch?v=0x-TDvnbheM (7:17)

Stormwater Runoff 101
http://www.youtube.com/watch?v=eozVMJCYHCM

Manufacturers, states, EPA sign agreement to reduce copper in brake pads
Washington brakes law serves as national model
http://www.ecy.wa.gov/news/2015/008.html **January 21, 2015**
"In Washington, brake pads release about 250,000 pounds of copper to the environment each year. When Washington's Better Brakes Law is fully implemented in 2025, this source of copper will be virtually eliminated."

Santa Clara Valley Urban Runoff Pollution Prevention Program PSA
http://www.youtube.com/watch?v=DX2FtTuJ0Y8 (0:32)

City of San Jose Storm Sewer System
http://www.sanjoseca.gov/index.aspx?nid=1615

City of San Jose **Environmental Services - Stormwater Annual Reports**
http://www.sanjoseca.gov/Archive.aspx?AMID=160

Floodplain Management

http://www.fpm.water.ca.gov/

"Integrated Pest Management" (IPM) strategies.
http://www.sccgov.org/portal/site/ipm/

18. April 6 — Grey Water Generation and Reuse, Rainwater Harvesting

Grey Water Reuse and Rooftop Rainfall Capture and Storage Systems
GROWin' and Savin' Water Too - Part 1/4 (edited)
https://www.youtube.com/watch?v=ppyZN3sQ24M (13:54)
(links to parts 2-4 are in Youtube side-bar)

About greywater reuse
http://greywateraction.org/greywater-recycling

Grey Water Information Central
http://www.oasisdesign.net/greywater/

About rainwater harvesting
http://greywateraction.org/rainwater-harvesting

19. April 13 — Sewage Treatment & Disposal

Wastewater Treatment: http://ga.water.usgs.gov/edu/wwvisit.html

Water Environment Federation Wastewater Treatment Primer:
http://www.wef.org/AWK/pages_cs.aspx?id=583

San Jose-Santa Clara WPCP: http://www.sanjoseca.gov/index.aspx?NID=1663

GHG Emissions from Treatment Plants: Video: Dr. Perry McCarty @UCBerkeley Water Colloquium: http://www.youtube.com/watch?v=15S4teA2l-M&feature=channel (1:11:54)

20. April 13 — Water Recycling and Reuse

Video: ***Water In an Endless Loop***, Water Reuse Association
http://www.vimeo.com/9333749 (23:21)

Water Recycling and Reuse: The Environmental Benefits
http://www.epa.gov/region9/water/recycling/

US EPA Brochure: Water Recycling & Reuse: Environmental Benefits
http://www.epa.gov/region9/water/recycling/brochure.pdf

Virginia: http://www.hrsd.state.va.us/waterreuse.htm

South Bay Water Recycling Project
South Bay Water Recycling:
http://www.sjenvironment.org/sbwr
http://www.sanjoseca.gov/DocumentCenter/View/34673

Membrane Filtration for Wastewater Reuse: Current Status and Future Developments
http://www.waterworld.com/index/display/article-display/7255208084/articles/water-wastewater-international/volume-25/issue-5/regional-spotlight/north-american-caribbean/membrane-filtration-for-wastewater-reuse-current.html?cmpid=EnlWaterWorldInter

21. April 20 Sediment Transport, Deposition and Tidelands

FIELD TRIP: Meet at regular class time at Coyote Creek Outdoor Classroom, located at 791 E. William St, in San Jose, between S. 16th and the Willaim St bridge, across from the Williams Street Park.
http://www.valleywater.org/Programs/CoyoteCreekOutdoorClassroom.aspx

Reading Assigments prior to Field Trip:

SEDIMENT SOURCES, TRANSPORT, DEPOSITION, AND RETENTION TIMES
http://water.usgs.gov/osw/techniques/workshop/hupp.html

Sediment Transport and Deposition
http://www.oregon.gov/DSL/SSNERR/docs/EFS/EFS32sediment.pdf

Protect Our Groundwater Resources at the Polls, October 14, 2014

http://www.sanjoseinside.com/2014/10/14/protect-our-groundwater-resources-at-the-polls/

22. April 20 Flood Protection:
Land Use Controls: Riparian Setbacks,
FEMA Flood Insurance Program
Levees and Bypass Channels

Natural Flood Protection
http://www.valleywater.org/services/NaturalFloodProtection.aspx

Fear of FEMA, Revisited
http://neverthirstpatferraro.blogspot.com/2009/01/fear-of-fema-revisited.html

Federal Emergency Management Agency
http://en.wikipedia.org/wiki/Federal_Emergency_Management_Agency
http://en.wikipedia.org/wiki/National_Flood_Insurance_Program

- http://www.FloodSmart.gov
- Federal law authorizing NFIP
- Experts: Flood terms mislead public

Report: Criticism of FEMA's Katrina response deserved
http://www.cnn.com/2006/POLITICS/04/14/fema.ig/index.html

23. April 27 Flood Frequency, Flow and Volume

Hydrologic Engineering Center (HEC)
http://www.hec.usace.army.mil/software/

24. April 27 Climate Change/Sea Level Rise

Addressing Climate Change in Long-Term Water Resources Planning and Management: User Needs for Improving Tools and Information
http://www.usbr.gov/climate/userneeds/
http://www.usbr.gov/climate/userneeds/docs/Summary-standalone-final.pdf

Water and Climate Change Adaptation
http://www.climatechange.ca.gov/adaptation/water.html
http://www.climatechange.ca.gov/adaptation/documents/Statewide_Adaptation_Strategy_-_Chapter_7_-_Water_Management.pdf

CA Climate Change Planning Program /San Francisco Bay Impacts:
http://www.bcdc.ca.gov/planning/climate_change/climate_change.shtml

Climate Change at the Doorstep PBS Video:
http://video.pbs.org/video/1818412519/ (11:35)

KQED Quest Audio File: (5:43)
http://science.kqed.org/quest/audio/rough-waters-for-sea-level-rise-planning/

25. April 27 The Sacramento-San Joaquin Delta & The Peripheral Canal

Fixing The Sacramento/San Joaquin Delta
http://neverthirstpatferraro.blogspot.com/2008/06/fixing-sacramentosan-joaquin-delta.html

Another challenge for Henry Waxman: Salt of the Earth
http://neverthirstpatferraro.blogspot.com/2009/05/another-challenge-for-henry-waxman-salt.html

26. May 4 Hydroelectric Power Generation

Geothermal Geyser Plants:
http://www.youtube.com/watch?v=Hj6ojHEmW8c&feature=channel

Hydroelectric power: How it works
http://ga.water.usgs.gov/edu/hyhowworks.html

Advantages of Hydroelectric Power Production and Usage
http://water.usgs.gov/edu/hydroadvantages.html

SCVWD Failure to Develop Hydro Power: Water and Power
http://neverthirstpatferraro.blogspot.com/2008/07/water-and-power.html

Tidal Power: http://en.wikipedia.org/wiki/Tidal_power

27. May 4 Integrated Water Resources Planning
http://www.waterencyclopedia.com/Hy-La/Integrated-Water-Resources-Management.html

28. May 4 Sustainability and Carbon Footprints

Water and energy quiz
http://www.circleofblue.org/waternews/2010/world/infographic-test-your-knowledge-with-the-water-and-energy-quiz/

Report: Arid West Can Help Meet Its Water Needs While Reducing Energy Use

New Low Impact Development Approach Offers Climate, Energy and Water Saving Solutions (download report from link on web page)
http://www.nrdc.org/water/lid/files/lid.pdf

30. May 11 Student Presentations

Friday, May 20 **Final Exam**
12:15 – 2:30 PM **Clark Hall Rm 234**
Submit by email ONLY to: PTFerraro5@gmail.com by 2:30 PM