

Spring 2017

ESM 121

W a t e r

Science and

Management



Professor: Samuel Sandoval Solis, Ph.D.

TAs: Belize Arela Lane, M.S. and Maritza Flores Marquez B.S.

University of California, Davis

ORGANIZATION
ESM 121 - WATER SCIENCE AND MANAGEMENT
Spring 2017, 3 units

- Classes:** 2 one-hour lectures and 1 one-hour of discussion per week
Lecture: 4:10 – 5:00 pm Monday and Wednesday, 234 Wellman Hall
Discussion sessions: 2:10 – 3:00 pm Thursday, 234 PLESC
3:10 – 4:00 pm Thursday, 234 PLESC
- Professor:** Samuel Sandoval Solis, 135 Veihmeyer Hall. Email: samsandoval@ucdavis.edu
Office hours: Wednesdays 2:30- 4:00 pm. Except April 26th & May 3rd. Other times only by appointment.
- Teaching Assistant:** Belize Lane and Maritza Flores, 138 Veihmeyer Hall. Email: baalane@ucdavis.edu, mfloresmarquez@ucdavis.edu
Office Hours: Wednesday 3:00 – 4:00 pm – Belize
Office Hours: Monday 3:00 -4:00 pm – Maritza
- Required Materials:** Materials will be posted on the class smartsite and at the class website: <http://watermanagement.ucdavis.edu/teaching/>
Books: (1) Rivers for Life by Postel and Ritzer (2003). (2) Managing's California's Water from Conflict to Reconciliation. Hanak et al. (2011)
Software: Excel and a simple electronic calculator. Mac users must install Windows in their Macs.
- Grading:**
- | | |
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| Exercises (Ex.) and Readings (Rd.). Late submission -10%/day
8 Exercises. Due <u>before</u> class.
7 Readings | 40% |
| Term Project.
Teams of 3-4 people
Abstract/Main idea (1/2 – 1 page), due Thursday April 20 th , 5 pm
Midterm report (1-2 pages) due Wednesday May 4 th
Presentation (5-6 min) due June 1 st and Jun 8 th
Final Report: Executive Summary/abstract (1 pg) + Report (7 pg. not less, not more. Not including citations) Jun 8 th | 30% |
| Exams.
Allowed 1 letter size cheat-sheet, must be <u>handwritten</u>
Midterm examination on May 3 rd
Final examination. Friday June 9 th , 3:30 PM – 5:30 PM | 15%
15% |
- Classroom Rules:** No use of computers/laptops/tablets open in class. No calling or texting on cellular/smart phones. No cellular on hand or in sight, it must be stored at all times. No headphones.

Class Calendar

Week	Class #	Content	Date	Session	Due Date
Hydrology 101					
1	1	Theory	Mon 3 Apr	Introduction to ESM-121	
	2	Theory	Wed 5 Apr	Hydrology 101	
	Dis.Sess.	Practice	Thu 6 Apr	Ex. 1: Population and water demand. Term Project	
Introduction to Water Resources Management					
2	3	Theory	Mon 10 Apr	Water in California & Introduction to WRPM	Rd 1
	4	Practice	Wed 12 Apr	Ex. 2: Wat. Demand, Wat. Conserv. & Efficiency	Ex. 1
	Dis.Sess.	Practice	Thu 13 Apr	Field Work at Russell Field (near UCD tennis courts)	
	---	Field Trip	Sat 15 & 16 Apr	Field trip to Hopland Research and Extension Center	
Water Budgets					
3	5	Theory	Mon 17 Apr	Water Budgets	Rd 2
	6	Theory	Wed 19 Apr	Water Resources Modeling & Principles: Simulation	Ex.2.
	Dis.Sess.	Practice	Thu 20 Apr	Ex. 3: Water Budget. Term Project	Abstract & Members
Water Resources Modeling: Principles of Simulation					
4	7	Guest Spkr	Mon 24 Apr	Romain Maendly – Department of Water Resources	
	8	Practice	Wed 26 Apr	Simulation Modeling and Ex. 4	Ex.3
	Dis.Sess.	Practice	Thu 27 Apr	Ex. 4: Simulation modeling (Bring your laptop)	Rd 3
Water Resources Modeling: Principles of Optimization					
5	9	Theory	Mon 1 May	Principles of Optimization & Q&A for Exam	Ex. 4
	10	EXAM	Wed 3 May	MIDTERM EXAM - ONLY 1st half of the course	
	Dis.Sess.	Practice	Thu 4 May	Ex. 5 Princ. Of Optimization and Mid-term Project	Midterm Report
Environmental Water Resources Management					
6	11	Theory	Mon 8 May	Principles of Environmental Flows	Rd. 4
	12	Theory	Wed 10 May	Cost Benefit Analysis	Rd. 5
	Dis.Sess.	Practice	Thu 11 May	Flows & Ex. 6: Flow Regime Analysis	Ex. 5
Cost - Benefit Analysis					
7	13	Theory	Mon 15 May	Cost Benefit Analysis	Rd 6
	14	Guest Spkr	Wed 17 May	Sean White – Water and Wastewater – City of Ukiah	
	Dis.Sess.	Practice	Thu 18 May	Ex. 7: Cost Benefit Analysis	Ex. 6
Risk Analysis					
8	15	Theory	Mon 22 May	Risk Analysis and Expected Monetary Value	Ex. 7
	16	Guest Spkr	Wed 24 May	Tamara Alaniz-Russian River Flood Control	
	Dis.Sess.	Practice	Thu 25 May	Ex. 8: Expected Monetary Value	
Climate Change and Integrated Water Resources Management					
9	---	Holiday	Mon 29 May	Memorial Day	
	17	Theory	Wed 31 May	Water Management Case Study: SGMA (Maritza Flores)	Rd. 7
	Dis.Sess.	Term Proj.	Thu 1 Jun	Term Project Presentation	Ex. 8
Term project Presentations					
10	18	Theory	Mon 5 Jun	Water Management Case Study: Environmental Flows (Belize Lane)	
	19	Practice	Wed 7 Jun	Panel of Alumni	
	Dis.Sess.	Term Proj.	Thu 8 Jun	Term Project Presentation	Final Report
	---	EXAM	Friday 9 Jun	at 3:30 pm. FINAL EXAM - ONLY 2nd half of the course	

Readings

Rd 1	Hanak et al. pp 15-40	Rd 4	Rivers for life pp. 5-26, 36-41
Rd 2	Hanak et al. pp 41-69	Rd 5	Rivers for life pp. 45-67
Rd 3	Hanak et al. pp 71-103	Rd 6	Groundwater Sustain. Progr. pp 4-31
		Rd 7	Harter et al. pp 1 – 34

Assignments

	Due Date
Ex. 1: Population and Water Demand	Apr/12
Ex. 2: Water Demand, Conservation & Efficiency	Apr/19
Ex. 3: Water Budgets	Apr/26
Ex. 4: Simulation Modeling	May/1
Ex. 5: Optimization Modeling	May/11
Ex. 6: Flow Regime Analysis	May/18
Ex. 7: Cost Benefit Analysis	May/22
Ex. 8: Expected Monetary Value	Jun/1

READING ASSIGNMENTS

Readings are important because the content will describe the history and status of water in California, as well as useful concepts of environmental and groundwater management. Readings are meant to awaken the curiosity of students in these topics.

Rd 1	Hanak, Lund et al. pp 15-40
Rd 2	Hanak, Lund et al. pp 41-69
Rd 3	Hanak, Lund et al. pp 71-103
Rd 4	Rivers for life pp. 5-26, 36-41
Rd 5	Rivers for life pp. 45-67
Rd 6	Groundwater Sustain. Progr. pp 4-31
Rd 7	Harter et al. pp 1-34

GUEST SPEAKER LECTURES

Guest speaker lectures are an important part of the course that allows you to interact directly with managers and water operators, scientists, water users and decision makers. During lectures, I hope students will relate the knowledge they are acquiring with the real world challenges that guest speakers bring to the session and learn about current water issues. Also, I expect active participation of students to develop communication skills, deepen understanding and learn about topics not covered in lecture. I hope that the seminar format and the interaction with all these people from different backgrounds will be useful, too, in preparing you for the kind of work you may find in your careers after graduation.

Mon 24 Apr	Romain Maendly – Water Available for Replenishment
Wed 17 May	Sean White – Water and Wastewater-City of Ukiah
Wed 24 May	Tamara Alaniz – Russian River Flood Control District
Wed 7 Jun	Panel of UCD Alumni

GUEST SPEAKER ACCOMPANYING ASSIGNMENT

1. Attend the entire talks of all speakers. We keep track of time attendance. Come to class on time (it is rude to walk in late). Each of the invited guest lectures is a busy individual and an expert in his/her field who has graciously volunteered their time to give a talk in this course.
2. Write an excellent one paragraph summary (main point) for each seminar, handwritten, due at end of each class period.
 - a) At the end of each seminar, you will have time in class to compose and write a **one paragraph 'main point' summary**. Turn in the one paragraph before you leave class. This assignment serves the purpose of giving you practice gleaning the essential elements of a research talk and it will give you practice writing a concise and a content-rich paragraph. The paragraph will be graded on the basis of what you write (content accuracy, i.e., 'getting the point').
 - b) **Benefits: Writing concisely but informatively is a valuable skill. This assignment will provide you with practice and feedback in understanding a research presentation and communicating the main points in writing.**
 - c) **Guidance for writing your one sentence:**
3. **Your one paragraph should reflect concisely and directly the main point of the speaker.** Listen carefully to the entire talk, think about the content, and decide what the main points were.

DISCUSSION SESSIONS

In the discussion sections we will discuss the seminar presentations of the guest speakers. In addition, this section will be used for hands on work! Here, I developed exercises that are meant to couple the theory and real world experiences with the estimation and development of water management plans. Where all the planning numbers come from? How are they derived? This is a very important part of the course where the ideas are landed into numbers and projections, which is significant for keeping track of the plans that we are proposing. There are 8 exercises for this course:

- Ex. 1: Population and water demand
- Ex. 2: Water Demand, Conservation & Efficiency
- Ex. 3: Water Budgets
- Ex. 4: Simulation Modeling
- Ex. 5: Optimization Modeling
- Ex. 6: Flow Regime Analysis
- Ex. 7: Cost Benefit Analysis
- Ex. 8: Expected Monetary Value

Links used in lectures

Introduction to ESM 101

Hydrology 101

Basin, rainfall-runoff processes :

http://stream2.cma.gov.cn/pub/comet/HydrologyFlooding/RunoffProcessesInternationalEdition/comet/hydro/basic_int/runoff/print.htm#page_1.0.0

Atmospheric Rivers:

<https://www.youtube.com/watch?v=s17XUx6Z5AA>

<http://www.latimes.com/science/la-me-atmospheric-rivers-20150119-story.html>

Water in California

<http://www.water.ca.gov/waterconditions/droughtinfo.cfm>

<http://gis.water.ca.gov/app/groundwater>