

## **FWIS 188: Water & Society (Division III)**

**INSTRUCTOR:** Antonia Sebastian, a.sebastian@rice.edu, ML 116, phone # (713) 348-4221

**MEETING:** TR 9:25-10:40 Sewell Hall Rm 462

### **COURSE DESCRIPTION**

In our lifetime, the availability of clean water will become one of the most important socio-political and economic discussions to date. In this course we will discuss how we, as humans (and engineers), have impacted water availability and how, in turn, water scarcity impacts us as a society. We will explore the emergence of the environmental movement in the 1970s, major structural engineering projects that have contributed to water scarcity, the relationship between water and energy, and technical engineering solutions for addressing water scarcity in the future. You will be asked to think analytically about major engineering concepts in order to develop coherent arguments grounded in science. Below is an example list of quantitative concepts I will cover during the course:

1. Important chemicals associated with groundwater contamination, including chlorinated solvents, and chemicals associated with major spills in the energy industry, such as MTBE. You will learn their chemical structures, why they are dangerous to humans, and why they persist in the environment.
2. Major structural engineering projects, such as pipelines, dams, and channels; for example, how they have contributed to increased/decreased sediment loading and decreased water quality in major river systems.
3. Current mechanisms for extracting non-renewable resources, such as mountain top removal, and hydraulic fracturing, and associated water quality deterioration.
4. Calculation of the hydrologic cycle and how climate change will affect the distribution of water across the planet in the future.
5. Emerging technologies, such as desalinization, grey water reuse, and advanced treatment; why some technologies might work better than others and which are most promising.

You will be exposed to different types of literature (e.g., books, journals, film) throughout the semester in order to provide insight to the topic of water and society. The chosen materials are designed to be thought provoking and inspire you to form opinions about the topic to be communicated both orally and in writing. You are encouraged to pay attention to current events and bring any relevant news articles with them to class. The skills developed in the course will provide you with a disciplinary framework for addressing future coursework, assignments and/or research topics that they may come across during their undergraduate career at Rice University.

Attendance and participation in class discussions is mandatory unless prior arrangements have been made. You must complete all assignments (oral and written) in order to pass the course. No late assignments will be accepted.

## **COURSE GOALS**

Utilize a variety of literary resources.

Understand major engineering concepts that impact water scarcity.

Craft a compelling argument, including a thesis statement.

Communicate ideas effectively and concisely, both orally and on paper.

Identify plagiarism and learn how to avoid it.

## **OUTSIDE RESOURCES**

It is not mandatory for this class, but you are encouraged to visit the Center for Written, Oral and Visual Communication (CWOVC). The peer consultants at the Center are able to give you feedback on topics such as the organization of your paper, the coherence of your argument, sentence structure, and grammar. The CWOVC is located on the second floor of Fondren Library. You can schedule appointments on the Center's website: [cwovc.rice.edu](http://cwovc.rice.edu)

## **OFFICE HOURS**

I will be available for student conferences on Tuesday and Thursday mornings (before and after class) and on Friday mornings. If you plan to come see me outside of class, please schedule an appointment. My office is located in Mechanical Laboratory #116 (at the east end of the hall on the first floor). Phone #: 713-348-4221 / Email: [a.sebastian@rice.edu](mailto:a.sebastian@rice.edu)

## **HONOR CODE**

The Rice Honor Code reads: "On my honor, I have neither given nor received any unauthorized aid on this [exam, quiz, paper, etc.]." ([http://futureowls.rice.edu/futureowls/Honor\\_Code.asp](http://futureowls.rice.edu/futureowls/Honor_Code.asp) ). Repeat or egregious violations to the honor code will be reported to the Rice Honor Council.

Note: You are encouraged to work and discuss with other students, so long as the final product is your own.

## **DISABILITIES**

If you have a documented disability that will impact your work in this class, please find time to speak with me during the first week. These discussions will be kept confidential. If you have not already done so, you will also need to register with the Disability Support Services in the Allen Center (<http://dss.rice.edu/>).

## **GRADING**

### **20% Class Participation**

Class time will be utilized for discussing the readings and your opinions thereof. In order to actively participate in discussion, you will need to have read (or watched) the assigned materials prior to the beginning of class. Points will be deducted when you have clearly not read the assigned material or choose not to participate in the discussion. We will also use class time to work on and practice communication skills, such as argument formulation and presentation. **Participation is mandatory and unexcused absences will result in the loss of up to 20% of your grade.**

There will be daily reading assignments and, occasionally, short videos and films. I will place the course reading materials on reserve in the library or on OwlSpace. When there are films, I will organize time to watch the film in class or in the evening in order to accommodate all of your schedules. I encourage you to purchase copies of the books as it will greatly assist with returning to previous readings and taking notes. We will be reading the following:

Jehl, Douglas. *Whose water is it? : the unquenchable thirst of a water-hungry world*. National Geographic Society, 2004. Print

Prud'Homme, Alex. *The Ripple Effect: the fate of freshwater in the twenty-first century*. New York: Scribner, 2011. Print.

Royte, Elizabeth. *Bottlemania: how water went on sale and why we bought it*. New York: Bloomsbury, 2008. Print.

### **20% Journal Entries**

The journal is designed as mechanism for writing practice and an opportunity to reflect on the topics we discuss in class. It should help to prepare you for the midterm and final papers. Journal entries are expected to be approximately one page and no more than two pages long. They should be clear and concise and outline your opinions on the assigned topic. There will be approximately one journal assignment per week; however you are encouraged to develop their own questions and journal entries in addition to those assigned as it will help with the midterm and final position papers. Opinions and ideas developed during the reflection will be shared at the beginning of each class and the completed journal entries will be collected electronically, reviewed, and returned.

### **30% Position Paper**

You will be asked to take a position on a water right's issue discussed in class. This assignment is designed to walk you through the process of creating a clear thesis statement and a well-crafted argument supporting your position. For this assignment you will be asked to submit a thesis statement, a revised thesis statement, an outline, a draft, and a final paper. Please refer to the schedule for due dates. Student-teacher conferences will be required during weeks 7 and 9. The final paper is due on Monday March 24.

## **20% Research Paper**

Pick a water-related issue of your choice that we did not spend much time on in class and that you would like to understand further. Research and discuss your opinion of this issue. Review at least three types of literary sources to support your argument (e.g., peer reviewed journals, newspapers, books, documentary film). You will submit a thesis statement and a draft for review, please refer to the schedule for due dates. The final revised paper will be due at the end of the finals period (date TBD).

## **10% Oral Presentation**

This will be a short (15 minute) group presentations of an assigned energy topic. Slideshows with pictures are encouraged where applicable. Prior to the presentation we will cover good practices for oral presentations and slide shows. At the end of each presentation there will be time for the class to ask the presenter questions about the topic.

## PRELIMINARY\* CLASS SCHEDULE

\*Please note that this is a tentative schedule for the semester and that I reserve the right to make changes as the semester progresses.

Week	Date	Monday	Tuesday	Wednesday	Thursday	Friday	
1	Jan. 13		Syllabus & Environmental Movement Lecture		Environmental Movement - Rachel Carson & the Clean Water Act	J1	
2	Jan. 20	MLK DAY - NO CLASS	The Ripple Effect - Part I (Water Quality)		Environmental Movement - Love Canal	J2	
3	Jan. 27		The Ripple Effect - Part I & II (Quality & Drought)		The Ripple Effect - Part IV (Water in the Twenty-First Century)	J3	
4	Feb. 3		The Ripple Effect (extra time)		Ownership	J4	
5	Feb. 10	Thesis Statement Due 9AM	Pipe Dreams		Pipe Dreams	J5 & Revised Thesis Due	
6	Feb. 17		Possible No Class		Drought	Outline Due	
7	Feb. 24		Scarcity		Scarcity		
8	Mar. 3	SPRING BREAK - NO CLASS					
9	Mar. 10		Bottled Water	Draft Due 9AM	Bottled Water		
10	Mar. 17		Bottled Water		Bottled Water		
11	Mar. 24	Position Paper Due	Water & Energy - Coal		Water & Energy -Oil	J6	
12	Mar. 31		Water & Energy - Natural Gas		MIDTERM RECESS - NO CLASS	J7	
13	Apr. 7		Energy - Oral Presentations		Energy - Oral Presentations	J8	
14	Apr. 14	Thesis II Due 9AM	Texas & Houston		Texas & Houston		
15	Apr. 21		Technologies & Conservation	Draft II Due 9AM	Climate Change		
16	Apr. 28		Study Days		Study Days		
17	5-May	Research Paper Deadline TBD					

## **PRELIMINARY\* READING SCHEDULE**

### **Week 1 – The Environmental Movement (Journal Assignment 1:**

1/14/14 – Syllabus

1/16/14 – HANDOUT - Rachel Carson Excerpt + Clean Water Act Excerpt/Article

### **Week 2 – Water Quality (Journal Assignment 2:**

1/21/14 – The Ripple Effect (Part Ia p. 1-72)

1/23/14 – HANDOUT - Love Canal NY Times Material (& Video)

### **Week 3 – Water Quantity (Journal Assignment 3:**

1/28/14 – The Ripple Effect (Part Ib & II p. 72-200)

1/30/14 – The Ripple Effect (Part IV – end p. 237-363)

### **Week 4 – Ownership (Journal Assignment 4:**

2/4/14 – The Ripple Effect

2/6/14 – HANDOUT - Whose Water is it? “Ownership” (p. 1-41)

*Watch China Town*

### **!!Week 5 – Pipe Dreams (Journal Assignment 5:**

2/11/14 – HANDOUT

“Giant Dams, Water Abundance, and the Rise of Global Society” in *Water: The Epic Struggle for Wealth, Power, and Civilization* by Steven Solomon, pp. 322-363

*Watch Cadillac Desert*

2/13/14 – HANDOUT

Readings TBA

*Watch Cadillac Desert*

### **Week 6 – Drought (Paper 1 Outline)**

2/18/14 – HANDOUT (Possible Missed Class)

Readings TBA

*Watch Cadillac Desert*

2/20/14 – HANDOUT

Bourne, J.K. (2010). California’s Pipe Dream: Dams, pumps, and canals can’t stave off a water crisis. *National Geographic*, 217(4), 132-145.

Colorado Drought Forces a Painful Reckoning for States (NY Times Article)

*Watch The Colorado River: Running Near Empty ~12 min*

[http://e360.yale.edu/feature/video\\_colorado\\_river\\_running\\_near\\_empty/2443/](http://e360.yale.edu/feature/video_colorado_river_running_near_empty/2443/)

Relief for a Parched Delta (NY Times Article)

Watch Bringing Back the Delta ~ 5 min

<http://www.nytimes.com/video/science/100000002168731/bringing-back-the-delta.html?ref=water>

**Week 7 – Scarcity (Paper 1 Draft)**

2/25/14 – Readings TBA

2/27/14 – Readings TBA

**Week 8 – Spring Break**

3/04/14 – NO CLASS

3/06/14 – NO CLASS

**Week 9 – Bottled Water (Paper 1 Draft)**

3/11/14 – Bottlemania & The Story of Bottled Water via the Story of Stuff

3/13/14 – Bottlemania

**Week 10 – Bottled Water (Paper 1 Final)**

3/18/14 – Bottlemania

3/20/14 – Bottlemania

**Week 11 – Water & Energy (Beer Bike Week) (Journal Assignment 6:**

3/25/14 – HANDOUT (Coal)

3/27/14 – HANDOUT (Oil)

Atlas, R.M. and Hazen, T.C. (2011) Oil Biodegradation and Bioremediation: A Tale of the Two Worst Spills in U.S. History. *Environmental Science and Technology*, 45(16): 6709-6715.

Additional Readings TBA

**Week 12 – Water & Energy (Journal Assignment 7:**

4/01/14 – HANDOUT (Natural Gas)

Steingraber, S. (2010). Shale Game. Orion

Kalisek, D. and Lee, L. (2011) The energy-water tug of war: Drought exacerbates the paradox of efficiently producing energy while conserving water. Texas Water Resources Institute, 20-22.

4/03/14 – NO CLASS Midterm Recess

**Week 13 – Presentations (Journal Assignment 8:**

4/08/14 – Presentations

4/10/14 – Presentations

**Week 14 – Texas & Houston (Work on Paper 2 Outline & Draft)**

4/15/14 – HANDOUT

Wythe, K. (2011). The Time It Never Rained: How Texas water management has changed because of recurring droughts. Texas Water Resources Institute, 11-16.

4/17/14 – HANDOUT

Additional Readings TBA

**Week 15 - Future Water Topics (Work on Paper 2)**

4/22/14 – HANDOUT

Whose water is it? “Prospects” (44 pages)

4/24/14 – HANDOUT [Climate Change (the Hydrologic Cycle)]

Larmer, B. (2010). The Big Melt: Glaciers that feed great Asian Rivers are shrinking. National Geographic, 217(4), 60-79.

Royte, E. (2010). The Last Drop: Earth’s future rests on better irrigation and shorter showers. National Geographic, 217(4), 172-176.

**Week 16 (Work on Paper 2 Final)**

4/26 – Study Days

4/28 – Study Days

**Week 17**

EXAMS