

ENSP 340

Water: Science, Ethics and Policy

Fall 2016

(Updated on August 30, 2016)

Instructor:

Jing Tao, Ph.D.
Earth System Science Interdisciplinary Center
University of Maryland
5825 University Research Court
Office Room 4025
College Park, MD 20740-3823

Phone: 301-405-5568
Email: JingTao@umd.edu

Class Meets:

Tuesdays & Thursdays
11:00am – 12:15pm
JMP 2202

Office Hours:

Time: TuTh 1pm-2pm
Location: Symons Hall 0206

Overview of the Course:

This course will apply an interdisciplinary approach to the emerging challenge of freshwater availability, a topic of broad environmental and social significance as the world faces issues of sustainability in the 21st century. Conflicts over water have become more intense in the past several decades, with competing users vying for an adequate supply of water. Water is also critically linked to issues of energy consumption, climate change, and habitat degradation. This course will introduce students to this complex topic through the lenses of science and policy.

Students will begin the course by studying introductory concepts in hydrology and water resources, freshwater availability and use, and water development. Water quality issues will be covered as they relate to freshwater availability. U.S. Federal and local water resources policy will be covered, and a guest lecture will be given on water resources law.

The second half of the course will cover several special topics, including the water/energy nexus (including water supply and water contamination issues), the economics of water and privatization, conflicts among freshwater users and between freshwater supply and wildlife habitat preservation, and seawater and brackish water desalination. The course will end with two comprehensive case studies that illustrate the broad range of topics covered in the class: California freshwater supply and impacts of the recent drought, and water crisis in African countries.

Four assignments will be assigned throughout the course, with the objective of providing students applied experience in resolving multi-disciplinary water resources related problems.

Learning Outcomes:

1. Demonstrate ability to analyze hydrologic and water supply data, including watershed delineations, groundwater flow mapping and quantification, groundwater contaminant plume mapping and wellhead protection areas, irrigation and municipal water demand requirements;
2. Develop a Watershed Management Plan, including reporting of water supply and demand, water quality

issues, demographics/population, service area, per capita water use;

3. Identify and evaluate major water-resources related policy and law issues;

4. Develop brief case study narratives of water contamination issues, as demonstrated through energy/water nexus case study assignment;

5. Interpret and evaluate water-resource conflicts, including conflicts between freshwater supply and wildlife;

6. Critically evaluate water resource issues of specific geographic regions, including understanding impacts of regional/local climate and hydrology, demographics, land use and economy.

Course Materials:

Textbook: Cech, T.V., 2009. Principles of Water Resources, History, Development, Management, and Policy, Third Edition. ISBN 978-0-470-73631-7.

Below are all available on ELMS:

- Alley et al., 2013. Report to Congress – Progress Toward Establishing a National Assessment of Water Availability and Use. USGS Circular 1384.
- California Dept. of Water Resources (DWR), 2015. Groundwater Sustainability Program DRAFT Strategic Plan, March 9 2015.
- Cooley et al., 2006. Desalination, With a Grain of Salt: A California Perspective. Pacific Institute, June 2006.
- Gerlak and Wilder, 2012. Exploring the Textured Landscape of Water Insecurity and the Human Right to Water. Environment Magazine, March/April 2012 p.5-17.
- Healy et al., 2015. The Water-Energy Nexus – An Earth Science Perspective. USGS Circular 1407.
- Hoekstra and Mekonnen, 2012. The water footprint of humanity. Proceedings of the National Academy of Science, Vol 109, p.3232-3237.
- Klein, Cheever and Birdsong, 2009. Natural Resources Law: A Place-Based Book of Problems and Cases. Chapter 14: Water (*Following Pages Required:* 843-848, 853-856, 859-863).
- Nicol, A. and Mtisi, S. , 2003. The politics of water: a southern African example, Sustainable Livelihoods in Southern Africa Research Paper 20, Institute of Development Studies, Brighton.
- Steinbeck, J. 1952. East of Eden (Chapter 1). Penguin Books Ltd.
- UNEP, 2010. Africa Water Atlas. Division of Early Warning and Assessment (DEWA). United Nations Environment Programme (UNEP). Nairobi, Kenya.
- USEPA, 2015. Enhanced EPA Oversight and Action Can Further Protect Water Resources From the Potential Impacts of Hydraulic Fracturing. Report No. 15-P-0204. July 16, 2015.

Evaluation and Grading Criteria

A total of 100 points is possible from the following cumulative sources; (a) Mid-term test 25%; (b) Final examination 25%; (c) Student Presentation 15%; (d) Assignments(4) 20%; (e) Final Paper 15%

Grades will be determined based on the following distribution: 100-98 = A+, 97-92 = A, 91-90 = A-; 89-88= B+, 87-82 = B, 81-80 = B-; 79-78 = C+, 77-72 = C, 71-70 = C-; 69-68 = D+, 67-62= D, 61-60 = D-; ≤ 59 =F.

Course Schedule:

Part I: Hydrology, Water Resources and Water Supply

Week 1 August 30/September 1. Introduction and Overview
Reading: Cech, Chapters 1-2

Week 2 September 6/8. Hydrology and Water Resources
Reading: Cech, Chapters 3-4
September 8: Begin Assignment #1.

Week 3 September 13/15. Freshwater Availability and Use
Reading: Alley et al., 2013; Hoekstra and Mekonnen, 2012

Week 4 September 20/22. Water Development, Storage, Transport and Supply/Water Efficiency and Recycling
Reading: Cech, Chapters 6-7
September 22: Assignment #1 Due (Before class); Begin Assignment #2.

Week 5 September 27/29. Water Quality and Water Resources
Reading: Cech, Chapter 5, Chapter 11

Part II: Water Resources Policy and Law

Week 6 October 4/6. U.S. Water Resources Policy
Reading: Cech, Chapters 9-10
October 4: Student Presentation Topic Choices Due.
October 6: Assignment #2 Due; Begin Assignment #3.

Week 7 October 11/13. U.S. Water Resources Law
Reading: Cech, Chapter 8; Klein, Cheever and Birdsong, 2009.
(Guest Lecture by Joanna Gogor, ENSP)

Week 8 October 18/20. Mid-term Review on Tuesday and Mid-term on Thursday

Part III: Water Resource Conflicts

Week 9 October 25/27. Water/Energy Nexus; Energy and Water Contamination
Reading: USGS, 2015; USEPA, 2015
October 25: Final Paper Topic Choices Due.
October 27: Assignment #3 Due; Begin Assignment #4.

Week 10 November 1/3. Economics of Water, Privatization and the Human Right to Water
Reading: Cech, Chapter 13; Gerlak and Wilder, 2012

Week 11 November 8/10. Water, Fish and Wildlife (**Student Presentations**)
Reading: Cech, Chapter 12

Week 12 November 15/17. Water Use Conflicts (Student Presentations)

Reading: Cech, Chapter 14

Week 13 November 22. Seawater and Brackish Desalination

Reading: Cooley, Gleick, and Wolff, 2006

November 22: Assignment #4 Due; Final Paper Outline/Draft Due.

(Thanksgiving Recession)

Part IV: Water Resource Case Studies

Week 14 November 29/December 1. California Case Study

Reading: CA DWR, 2015; (*Optional: Steinbeck, 1952*)

Week 15 December 6/8. International Case Study (African Countries) and Final Exam Review

Reading: UNEP , 2010; Nicol, and Mtisi, 2003.

December 8: Final Papers Due.

December 20 (Tuesday). Final Exam

Course Policies

Late Policy

Unless you see me in advance of the due date and obtain an approved excuse, 5 percent of the total possible points will be deducted from your score for every day the assignment is late, including weekend days. (So, for example, on a 100-point scale, a student who would have earned a 94 on a timely paper will earn 89 if the same paper is turned in one date late, 84 if turned in 2 days late, etc.).

Attendance and Absences:

In accordance with University policy, students are expected to attend classes regularly and on-time. Attendance will not be taken on a regular basis, but failure to attend class is likely to impact your grade because the lecture materials will be a primary source of exam material.

An absence will only be considered excused under the circumstances described by the University's attendance policy, available at:

<http://www.umd.edu/catalog/index.cfm/show/content.section/c/27/ss/1584/s/1540>.

Academic Accommodations:

If you have a documented disability, please contact Disability Support Services 0126 Shoemaker Hall. Each semester students with documented disabilities should apply to DSS for accommodation request forms which you can provide to your instructors as proof of your eligibility for accommodations. The rules for eligibility and the types of accommodations a student may request can be reviewed on the DSS website at <http://www.counseling.umd.edu/DSS>. Please provide your documentation to me well in advance of any scheduled due dates or exams so that I can be sure that all of your accommodation needs are satisfied.

Religious Observances

The University System of Maryland policy provides that students should not be penalized because of observances of their religious beliefs. Students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. *It is the responsibility of the student to inform the instructor of any intended absences for religious observances in advance.* Notice should be provided as soon as possible but no later than the end of the schedule adjustment (drop/add) period.

Code of Academic Integrity

Academic dishonesty (such as cheating on exams, plagiarism from the internet or other students, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents and forging signatures) is unacceptable and will result in referral to the Student Honor Council after which a determination of a violation will result in a failing grade in the course and a note on your transcript indicating a violation of the rules of academic integrity. The University's Code of Academic Integrity sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student, you are responsible for upholding these standards for this course:

1. No cheating (“intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise”);
2. No fabrication (“intentional and unauthorized falsification or invention of any information or citation in an academic exercise”);

3. No facilitating academic dishonesty (“intentionally or knowingly helping or attempting to help another to violate any provision of this Code”);
4. No plagiarism (“intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise”).

For more information on the Code of Academic Integrity or the Student Honor Council, visit www.shc.umd.edu.

Copyright Protection for Class Materials

Commercial firms have been paying students to take notes and collect course materials, which are then copied and sold. Course materials that exist in a tangible medium, such as written or recorded lectures, Power Point presentations, handouts and tests, are copyright protected. Students **may not** copy and distribute such materials except for personal use and with the instructor's permission.

Course Evaluation

Your participation in the evaluation of courses through CourseEvalUM is a responsibility you hold as a student member of our academic community. Your feedback is confidential and important to the improvement of teaching and learning at the University. By completing all of your evaluations each semester, you will have the privilege of accessing online, at Testudo, the evaluation reports for the thousands of courses online at Testudo. Evaluations can be completed at www.courseevalum.umd.edu.