EOS 385K

Water Resources

Fall 2014

Dates / contact hours: 300 minutes of contact time per week for 7 weeks
Academic Credit: 1 course
Areas of Knowledge: NS (Natural Sciences)
Modes of Inquiry: STS (Science, Technology, & Society)
Course format: Lectures and discussions, plus field trips

Instructor's Information

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&
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Division of Earth and Ocean Sciences
Nicholas School of the Environment
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Prerequisite(s), if applicable

No prerequisite (background in science preferred)

Course Description

This course will be divided into two sections. One half will be presented by Prof. Vengosh on Water Resources and the links between water quality and health, the other half by Prof. Cassar on Water Pollution. Prof. Vengosh would probably be on the DKU campus for approximately 3 weeks and Prof. Cassar for 5-7 weeks. Material would be integrated and there would be overlap in the physical presence of the two instructors.

The first half (Vengosh) is focused on basic concepts of the global water crisis, global water demands and availability, water management, water quality and health issues. This section will highlight the relationships between human activities (e.g., the water-energy nexus), water scarcity, water quality degradation, remediation technologies (e.g., desalinization), and ecological and health. consequences. The course will also address some policy implications related to international conflicts over water resources and the impact of energy production on water resources.

The second half (Cassar) is designed to present students with a comprehensive introduction to the sources and impacts of pollution in marine and freshwater environments. Fundamental concepts and principles of aquatic biogeochemistry will first be introduced: marine and freshwater chemistry, primary production and food webs. Topics to be covered include biological (e.g. pathogens, invasive species), physical (e.g. thermal, plastics), and chemical (e.g. nutrient loading, oil, pesticides, metals) pollutants.

Course Goals / Objectives

Students should be able to understand basic concepts in the areas of water resources and water pollution; read, comprehend, and evaluate primary scientific literature; integrate material from different sources and think synthetically; present material clearly in oral and written formats; work in groups; interact productively with research scientists during a Skype Q&A session.

Required Text(s)/Resources

Aquatic Pollution: An Introductory Text. 3rd Edition (2000), by Edward A. Laws, John Wiley and Sons, Inc. NY ISBN 0-471-34875-9.We may not cover all the chapters. A vote will be taken at the beginning of the semester to determine which topics are of most interest to the students (http://www.questia.com/library/117484491/aquatic-pollution-an-introductory-text)

Recommended Text(s)/Resources

Additional Materials (optional)

Notebook

Course Requirements / Key Evidences

Exercises will generally be given on a weekly basis. Unless stated otherwise, assignments will be due a week later at the beginning of the class. Oral presentation will consist of a lecture given by students working in groups on a particular bio-geo-chemical aspect of water management, aquatic

pollution and a synthetic and critical review of a scientific paper (not review paper) published in the last 10 years. If possible, it will be followed by a 20-25min Skype discussion with the lead author of the paper. The presentation should be ~30 minutes (lecture and presentation of papers) and will be followed by Skyping™ of the lead author of the paper. The students presenting are responsible for finding the articles. Students should submit to the TA their presentation topic, scientific paper to be reviewed, and should have contacted the lead author of the paper to make sure they are available for a videoconference call on the date of the presentation.

Technology Considerations, if applicable

Sakai will be used for communications with students, uploading scientific papers and lectures, and assignments. Skype will be used to contact world experts on the various topics

Assessment Information / Grading Procedures

Grade in the course is based on assignments (25%), midterm (25%), final exam (cumulative; 35%), oral presentation (10%) and level of participation (5%).

Diversity and Intercultural Learning (see Principles of DKU Liberal Arts Education)

The course will accommodate students from a variety of background and expertise and will provide a common ground for engaging students from both physical and social sciences background. The course will provide the students with opportunity to discuss scientific published papers and will explore the students' own interests in detailed evaluating topics that are close to them. Special attention will be given to the international aspects of the course.

Course Policies and Guidelines

Level of participation during these discussions and throughout the lectures is very important and will be evaluated. Material presented by students may be on exams. All students are responsible for reading the article chosen by the student presenters and writing a short review on this article (due before the student's presentation). Reviews will be graded as part of the assignment grade.

Duke University holds its students to the highest standards of academic integrity and honesty. Academic dishonesty of any kind is not tolerated and might result in failure of the assignment, and/or course, and/or expulsion from the university. Plagiarism on written assignments will result in a zero for the assignment and might result in further disciplinary action through the university. As a Duke student you pledge to uphold the Duke Community Standard:

- I will not lie, cheat, or steal in my academic endeavors;

- I will conduct myself honorably in all my endeavors; and
- I will act if the Standard is compromised.

For more information on academic integrity and the Duke Community Standard see:

http://judicial.studentaffairs.duke.edu/resources/community_standard/cs_more.html

Tentative Course Outline or Schedule

Schedule for the semester: Introduction, Course Objectives, Global hydrology and climate change, Hydrogeology, Water quality, Water contamination processes, Global salinization, Concepts of transboundary rivers and aquifers, technical solutions, desalinization, International law, Photosynthesis / Primary Production, Nutrient/Light limitation, Controls on primary production, Eutrophication, Non-point source pollution and urban runoff, Case studies, Sewage Treatment Plant Design, Pathogens, Oil pollution, Toxicology, Ocean Acidification, Pesticides, Thermal/Metal pollution, Groundwater pollution, Acid rain, Industrial pollution, Plastic pollution, Radioactive pollution and toxicology. We may be able to visit the Sewage Treatment Plant and Water Quality Labs.

Bibliography (optional)

Post / course codes
18 February 2014