

Water, Environment, and Climate Change

Earth Sciences 405

Section: D100

Term: 2013 Spring

Instructor: Dr. Diana Allen (Email: dallen@sfu.ca; Phone: 778-782-3967; TASC1 Room 7239)

Discussion Topics: Changes to the water cycle resulting from changes in climate and changes to the broader environment directly impact people and ecosystems. Our understanding of hydrologic system response to climate fluctuations continues to rapidly evolve, building on a substantial and productive research history. Fundamentally, questions remain about changes to water budget components, including precipitation, evapotranspiration, streamflow, and groundwater recharge due to uncertainties in the physical processes themselves and the climate change predictions. Similarly, the suitability of historical records for forecasting is sometimes compromised by persistent natural variations and human driven changes (e.g., urbanization). Managing water resources requires the ability to provide reliable predictions of the response of the water cycle to changing environmental conditions at a range of scales. How will the hydrologic system and associated subsystems respond to, and evolve under, natural and human induced changes in climate and the environment?

In this course, students integrate their knowledge of the hydrological sciences (climate, hydrology, hydrogeology, water chemistry) to understand the various linkages between the sub-disciplines, exploring the water cycle and its relevance to water resources. We will first review climate science from the perspective of climate variability and climate change (causes, past evidence, approaches for making predictions about the future). We will then focus on the various impacts to water cycles over a range of scales, considering both climate and other environmental stressors. The secondary impacts of climate and broader environmental change on the environment (including impacts to humans and aquatic ecosystems) will be explored in the second part of the course by focusing on current issues in different regions around the globe to generate ideas for potential adaptive solutions.

Course Topics:

Climate Variability and Change: Understanding the past and making predictions into the future.

Impacts to Water Cycles: From the catchment scale to global scale (e.g., shifting hydrologic regimes, salinization, desertification).

Secondary Impacts to Humans and Aquatic Ecosystems: Water sustainability; drinking water quality; food security; energy security; ecohydrology.

Adaptive Solutions: Conjunctive use of surface water and groundwater; watershed management.

Course Organization:

Normally, this course will comprise one 2-hour lecture, and one 1-hour seminar each week. The format for the weekly lectures will comprise formal lectures. Weekly seminars will encompass a range of activities (lecture based assignments, writing assignments, group activities, discussion of selected readings). The format for group activities will include roundtable style, breakout groups, debate, etc. so as to expose students to different forms of group dialogue. The course will culminate in a written term project whereby students will select a region and undertake a climate change impacts/adaptation/mitigation assessment. Oral presentations will be given on the term project.

Grading: 1. Assignments (3) 15%
2. Participation (group activities and discussions) 25%
3. Writing Intensive Assignments (3) 35%\x09\x09\x09
4. Term Paper\x09and Presentation 25%

Required Texts: Nigel Arnell. 2002. Hydrology and Global Environmental Change. Prentice Hall, 368 pp. ISBN 978-0-582-36984-9

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Recommended Texts: Selected Readings: Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report (available free online); various journal publications (available through SFU library).

Materials/Supplies: None.

Prerequisite/Corequisite: EASC 304; EASC 412; GEOG 311. Recommended pre-requisite: GEOG 411.

Notes: None.

This outline is derived from a course outline repository database that was maintained by SFU Student Services and the University's IT Services Department. The database was retired in 2014 and the data migrated to SFU Archives in 2015.