

Water Security for the 21st Century (Earth Sci 411)

call number: 17432-4

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Description

Examines the major issues that are contributing to the decline in quantity and quality of global freshwater resources and the resultant environmental and societal impacts.

Meeting Times

M T 0230P-0418 ML 0115
W 0230P-0318 ML 0115

Prerequisite

GEC data analysis course; sophomore standing and above

Office hours

MTW 1030A-1118
RF 1118A-1218 ML 0229 or by appointment (e-mail: ibaraki.1@osu.edu)

Required Text/Reading List

This is an extremely current subject. Consequently, a textbook is not required for the class; literature readings and website information will be provided or placed on reserve in Orton Library.

Content

This course will provide a broad introduction to the critical issues relating to the world's freshwater resources. A wide range of freshwater resource issues and water policy topics will be presented in a combination lecture and interactive seminar, group or individual project, and exercise format. Current and past scientific and popular literature articles and website information focusing on a particular water issue will be assigned each week for class review and discussion. Students will develop an awareness and fundamental understanding of the interrelations between freshwater resources and past, present, and projected environmental, socioeconomic, and political conditions. Following an introduction to basic principles and concepts of the hydrological cycle, subsequent lectures will address a range of problems from drought and climate change to competition for and contamination of scarce freshwater supplies.

Course Objectives

The overall objective of this course is to introduce students to and foster discussion on the many scientific and political facets of the world's leading freshwater issues. Additionally, upon successful completion of the course, students will have developed an understanding of fundamental climatological and hydrological principles.

Course Grades

The course will be graded according to results from examinations, exercises, and class participation, as follows:

(1) Midterm exam	30%
(2) Final exam	35%
(3) Assignments and projects	35%

The table below shows letter grades and associated percentages.

Grade	Percent
A	93 - 100
A-	90 - 92
B+	87 - 89
B	83 - 86
B-	80 - 82
C+	77 - 79
C	73 - 76
C-	70 - 72
D+	67 - 69
D	60 - 66
E	59 and below

Policies on Attendance and Absences

Attendance is **required** at all lecture sessions. The instructor should be notified as soon as possible in emergency situations where students must miss class. The deadline for make-up work for missed assignments, quizzes or examinations is one (1) week from the original date of administration. Each student must meet individually with the instructor regarding make-up work for missed assignments.

Disability Services

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue (telephone 292-3307, TDD 292-0901, (<http://www.ods.ohio-state.edu>)).

Academic Misconduct

The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students will complete all academic and scholarly assignments with fairness and honesty. Failure to follow the rules and guidelines established in the University's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct".

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process". Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. All suspected cases of academic misconduct will be reported to the University Committee on Academic Misconduct. If academic misconduct has been committed, possible sanctions could include a failing grade in this course and suspension or dismissal from the University.

Topical Outline

The following is a tentative, chronological outline of course lecture and associated group or individual project and exercise topics:

1. Course overview (Weeks 1-3)
 - Introduction to principles and concepts of the hydrological cycle
 - Concepts and case studies in water balance
 - Principles of ground water and surface water hydrology
 - Hydrological basins and watersheds
 - Global distribution of freshwater resources and demographics

- Virtual water budget
2. Introduction to climatic influences on the hydrologic cycle (Week 4)
 - Greenhouse gases, melting of polar ice caps and glaciers, rising sea levels
 - ENSO, Pacific Decadal Oscillation, SST
 - Droughts and floods in the Colorado River Basin; climatic connections
 3. Competition over water resources (Week 5)
 - Jordan River (Israel, Syria, Lebanon, Jordan)
 - Nile River (Ethiopia, Sudan, Egypt)
 - Colorado River (western states, USA, Mexico)
 - GAP project (Turkey, Syria, and Iraq competition for Tigris-Euphrates)
 4. Reshaping the hydrosphere (Week 6)
 - River diversions – China’s water problems
 - Draining wetlands
 - Groundwater mining – Case study of the High Plains Aquifer
 - Urbanization
 5. Water uses and abuses (Week 7)
 - Irrigation & agricultural pollution – Mississippi River and Gulf of Mexico hypoxia; Chesapeake Bay
 - Industry & industrial pollution – Hudson River and PCBs
 6. Water and Health (Week 8)
 - Drinking water supply and sanitation: historical and global perspective
 - Water-borne pathogens
 - Bacterial: Recent cholera outbreaks in South & Central America; typhoid fever, *E. coli*
 - Protozoan: *Giardia lamblia*, *Cryptosporidium*
 - Viral: Hepatitis A, poliomyelitis
 - Water and vector-borne diseases
 - Mosquito: malaria, yellow and dengue fevers, and West Nile virus
 - Snail: Schistosomiasis or snail fever
 - Chemical contaminants in drinking water
 - Synthetic organic pollutants: THMs, chloroform, benzene
 - Arsenic (Bangladesh water well issues)
 - Lead, nitrates
 7. Water Conflicts – Hydroterrorism (Week 9)
 - Destruction of marsh wetlands of southern Iraq
 8. Solutions for sustainable freshwater resources (Week 10)
 - Conservation and reuse
 - Rational water pricing
 - Integrated water resources management
 - Water as a commodity - trading water rights
 - Population control
 - Desalination