

**SCHOOL OF ENGINEERING
UNIVERSITY OF GUELPH
ENGG*2550: WATER MANAGEMENT
WINTER 2013 - Course Outline**

Calendar Description:

The influence of fundamental engineering and hydrologic principles on the choices available for management of water on a watershed basis is demonstrated for representative techniques used in management for water supply, irrigation, flood control, drainage and water pollution control. Selected problems are studied to reveal the technical, environmental, legal, jurisdiction, political, economic and social aspects of water management decisions.

Prerequisites: (CHEM*1040 or CHEM*1310), GEOG*2000

Objectives:

At the successful completion of this course, the student will have demonstrated:

- 1) an appreciation of watershed management principles and techniques
- 2) the ability to identify and discuss the multiple dimensions of global water management issues
- 3) the ability to perform quantitative analyses of water resources – groundwater, lakes, rivers, wetlands – and the effects of human activities on these water resources
- 4) knowledge of the tools and techniques used in water management and the ability to apply this knowledge to develop solutions to water management challenges
- 5) an understanding of Ontario's legislative framework for water management

Faculty:

Andrea Bradford, PhD., P.Eng.
Room 1342, Thornbrough Building.
Office Hours: By Appointment.
e-mail: abradfor@uoguelph.ca

Teaching Assistant: None

Class Times and Locations:

Monday, Wednesday, Friday 1:30-2:20 MACK 313

Textbook: None Required

Course notes:

Most lectures will be conducted using a document camera or computer projector. Selected lecture notes will be provided on Courselink but students are expected to provide further annotation and may need to take full notes on some topics.

Other resources:

Required readings will be assigned weekly. Students should be prepared to discuss the required readings during the lecture periods. Other recommended readings may also be suggested.

Proposed Course Organization (subject to adjustment):

Week 1: Fundamental water management concepts and themes for the course

Properties of water. Inter-relationship of land, air and water systems. Inter-relationship of quality and quantity. Competing demands and the multiple dimensions of water management - social, economic and ecologic. Water budgets. Unintended consequences.

Week 2: Water Supply and Demand Management

Groundwater and surface water sources. Alternative supplies. Water quantity and quality requirements. Competing demands. Demand management. International challenges.

Week 3: Introduction to Watershed Management

Definition and delineation of watersheds. The hydrological cycle within watersheds. Important principles of watershed management. Effects of human activities. Tools for watershed management.

Weeks 4 and 5: Rivers

Hydrology and hydraulics. Fluvial geomorphology. Low water response. Flood management.. Stream restoration. Ecological flow assessment. Water quality.

Weeks 5 and 6: Groundwater and Surface Water: A Single Resource

The subsurface environment. Groundwater flow. Groundwater – surface water interactions. Introduction to geochemistry. Source Protection.

Reading Week

Week 7: Wetlands

Wetland types and functions. Wetland hydrology. Wetland policy. Minesing Swamp Case Study. Wetland protection and restoration.

Week 8: Lakes

Physical, chemical, and biological characteristics of lakes. Thermal stratification. Buffering capacity. Nutrient cycles. Eutrophication. On-site systems. Lake Winnipeg Case Study.

Week 9: Presentations

Innovative treatment technologies. Groundwater remediation. Wastewater reclamation and reuse. Stormwater management.

Week 10: Presentations

Privatization. Climate change adaptation.

Week 11: Presentations

Coastal engineering. Stream restoration.

Week 12: Integrated Management

Evaluation:

Presentation/Abstract	-	20 %
News Critique	-	20 %
Assignments	-	30 %
Final Exam (Fri Apr 19, 7:00 - 9:00 pm)	-	30 %

Assignments:

There will be two, multi-part, assignments during the term. Components of the assignments will involve in-class activities. These activities will require preparation and active participation.

Please Note:

The Regulations concerning Academic Misconduct as outlined in the University of Guelph, Undergraduate Calendar for 2012-2013 will be strictly enforced.

Disclaimer:

The instructor reserves the right to change any or all of the above in the event of appropriate circumstances, subject to University of Guelph Academic Regulations.

Critique of Media Coverage (Newspaper Article) of a Water Issue or Event

The assignment is to follow “Water in the News,” select a current event or issue which has been reported in the popular media, and write a critique of the media coverage. The media coverage must include at least one article in print (or available on news agency website) which must be handed in with the critique.

The critique, which should be about 5 pages (12 point font, 1.5 line spacing, 3 cm margins), should include a brief description of the issue or event, discussion of the dimensions of the issue which were reported, and comment on potential dimensions of the issue which were not addressed by the media coverage.

The critique must be printed on paper and also provided as an email attachment to the instructor by the due date. The hard copy will be returned, but an electronic copy will be retained. The assignment is due Wednesday, February 27 (1:30 pm). Late submissions will not be accepted.

The marking scheme for the critique is as follows:

Provision of newspaper clipping (s)	2.0
Quality / depth of discussion	12.0
Quality of writing	6.0
TOTAL	20.0

Presentation on Selected Topic

Students, in groups of 2, will select a topic in water resources management and prepare and deliver a presentation on this topic. Topics must be approved by the instructor. An abstract and list of sources is due on Friday, February 15 at 1:30 pm. The presentations will be scheduled during weeks 9, 10 and 11. The presentation will be 20 minutes with an additional 5 minutes for questions. Presentations will not be rescheduled. If a presentation is missed due to illness or other circumstances that merit consideration, a written paper on the selected topic must be submitted.

The marking scheme for the presentation is as follows:

Technical content	
technically sound and free from error in fact or logic	4.0
content an appropriate level for 2 nd year course	4.0
demonstrated understanding of content	6.0
Quality of presentation	
Visual (e.g. not too much text; good use of illustrations; attractive slide design, free from typos / grammatical errors)	3.0
Oral (e.g. good eye contact, clear voice)	3.0
TOTAL	20.0

You should use at least eight primary references. Sources of information must be appropriately referenced. You should be aware that there are penalties for plagiarism at the University of Guelph and that the instructor will try to be both vigilant and vigorous in the scrutiny of work.

Topic Selection

The topic may be a:

- a) water management issue. The presentation should present the issue and its multiple dimensions which may be technical, ecological, social, political, legal, and /or economic. It should review management techniques which may be used to address the issue or water management analysis techniques which could help in the development of solutions.

- b) tool used in the analysis and/or management of water resources. The presentation should describe the tool and its applications in water management. It should review the benefits and drawbacks to the use of the tool and provide at least one case history of its application to analysis or management of a water management issue.

Tools and techniques may be based on the physical sciences, biological sciences, engineering, economics and/or social sciences. There are many acceptable topics. To avoid duplication of topics and to ensure that the scope of your selected topic is appropriate for the assignment, please have your topic approved by the instructor.