

# SYLLABUS: GGR334 H1F: WATER RESOURCES MANAGEMENT

University of Toronto, Fall 2020

Class Day/Time: Wednesdays, 12 to 2 pm

**Location:** This course is 'synchronous' however, recordings of lecture will be available for students to view asynchronously. I will hold online lecture on BB Collaborate on Wednesdays between 12 to 2 pm; and post the recorded lectures by 3 pm for you to watch at your convenience.

**Instructor:** Dr. Romila Verma

Instructor Email: [romila.verma@utoronto.ca](mailto:romila.verma@utoronto.ca)

Office Hours: Wednesdays, 2 to 3 pm on BB Collaborate or by appointment only

## Teaching Assistant

Name of Teaching Assistant: Hernan Bianchi Benguria [hernanluisbianchi@gmail.com](mailto:hernanluisbianchi@gmail.com)

## Course Description

Water is one of the most precious resources on the Earth, but its mindless consumption and abuse has created severe crisis in many parts of the world. We live on "the blue planet", abundant with water. However, due to decades of mismanagement, unlimited depletion, pollution and issues accelerated now by climate change, we have reached this crisis point. This course will examine the complex interlinkages between the four pillars of water management – science, economics, management/governance AND spiritual connections. This course is designed to prepare future water resource managers to effectively understand the complex problems, dynamics and techniques to manage our water resources for present and future generations. Case studies from the developed and from developing countries as well as rural and urban areas will be examined.

Our focus in this course is to understand and examine the water management issues through the lens of four- pillar approach to water sustainability. In the absence of, or weakness in any of the pillars, water sector is vulnerable to continued inequity, depletion and contamination.

- The first pillar is to integrate the strong spiritual and philosophical connections we have with water especially learning from the indigenous cultures of the world. In the absence of,

or weakness in any of the pillars, water sector is vulnerable to continued inequity, depletion and contamination.

- The second pillar is to invest in understanding the science of water and integrating with innovative technologies. Some topics to be covered: hydrology, contamination, water filtration, wastewater treatment, stormwater management, climate change impacts.
- The third pillar is to examine the common narrative of looking at water purely as an economic good, to feed the endless cycle of demand and supply. We will investigate how water becomes a “resource” when agriculture, industries and municipal sectors compete for limited water sources.
- The fourth pillar is to understand and implement effective management and governance policies based on combination of supply side, demand side, soft path approach and integrated watershed management. Additionally, we will examine the role of governance in creating effective laws and policies to legislate water.

### **Learning Outcomes**

By the end of this term, students are expected to learn about the following topics and be able to apply sound management techniques in order to solve real world water-related problems:

- Understanding the spiritual connectivity and ethical aspects so we can integrate these themes into water policies.
- Basic concepts of hydrology and water resource, like water properties, hydrological cycle, sources of water and water balance calculation.
- Impacts of population, urbanization, agriculture and climate change on water. Also, to explore the linkages between water and human health.
- To understand and apply water management techniques like, supply side management, demand management, soft path approach and integrated water resource management.
- To examine the role of effective governance through creating strong policies and legislation to ensure quality water for all and forever.

### **Course organization**

#### **Access to Course Materials & Readings**

Recorded lectures will be posted on Quercus every Wednesday by 3 pm. All the assignment/Quiz/assessment guidelines will also be posted on Quercus.

#### **Submissions**

Assignments and final assessment are required to be uploaded on Quercus. Research paper will be uploaded through Turnitin. There are no hard copy submissions in this course. Mid-term test will be administered online on Quercus.

#### **Tutorials/Practicals**

There are no tutorials/practicals in this course.

## Assignments and Evaluation

### Key dates

1. Research Proposal	10%	October, 7, 2020
2. Mid-Term Test	20%	October, 28, 2020
3. Water Policy Design	15%	November, 25, 2020
4. Research Paper	30%	December 9, 2020
5. Final Assessment	25%	TBA

### Assignment Details

#### Assignment 1 – Research Proposal

Due date and weight: October 7, 10%

Describe the assignment: You will be able to choose a topic of your interest from the list provided. The research proposal will be approximately 500 to 600 words plus 6 references and should briefly introduce the topic, objectives and the structure of the paper.

#### Assignment 2 – Mid-Term Test

Due date and weight: October 28, 20%

Describe the assignment: This test will be 60 minutes long. The first part will consist of a series of multiple choice and true/false questions. Second part will be short question and answers. You will have a window of 24 hours to access the test but once you log on, you will have to complete the exam within 60 minutes.

#### Assignment 3 – Water Policy Design

Due date and weight: November 25, 15%

Describe the assignment: You will be given a case scenario on a water issue, based in Canada. You will develop a policy paper to design a sustainable water solution to the problem.

#### Assignment 4 – Research Paper

Due date and weight: December 9, 30%

Describe the assignment: This is an opportunity for the students to examine and apply the information they have learnt in the class to the real-world water related issues. The research paper is based on the proposal you will submit at the beginning of the term. The research paper should be between 8-10 pages. At least 10 references are expected.

## Assignment 5 – Final Assessment

Due date and weight: TBA, 25%

Describe the assignment: The final assessment will be for two hours and will be administered in two parts: the first part will consist of short question and answers and the second part will be one essay question. You will have a window of 24 hours to access the exam but once you log on, you will have to complete the exam within 2 hours.

## Late Penalties

Late penalty of 5% per day, including weekends. Assignments will not be accepted more than 1 week after due date. Extensions without penalty will be granted for reasons of accommodation, illness or emergencies when appropriate documentation is submitted to the instructor.

Reweighting of assignments/grades is not permitted.

## Required Text

There is no textbook for this course. Required readings will be posted on Quercus.

## Course Schedule

### Week 1 – September 16

Topic: Introduction

Readings:

1. Zehnder, Alexander J. B., Hong Yang and Roland Schertenleib, *Water issues: the need for action at different levels*. Aquatic Science, (2003) 1–20.

### Week 2 – September 23

Topic: Water Ethics

Readings:

1. Barlowe, M., and Clarke, T, 2002. *Everything for Sale. Blue Gold: The Battle Against Corporate Theft of the World's Water*, Mclelland and Stewart
2. Bakker, K. 2007. *Commons or Commodity? The debate over private sector involvement in water supply*. Eau Canada. UBC press.

### Week 3 – September 30

Topic: Hydrological Science

Readings:

1. Hough, M. (1995) *Cities and Natural Process*. Pp.23-51. London, Routledge
2. Berg, Hagar, Goodman, Baydack. 2010. *Visualizing the Environment: Canadian Edition. The Importance of Water.*, Chapter 9, pages 288-309, John Wiley & Sons.

### Week 4 – October 7

Topic: Water as Resource: Municipal Water Use

Readings:

1. Berg, Hagar, Goodman, Baydack. 2010. *Visualizing the Environment: Canadian Edition*. Water Management, Chapter 9, pages 310-321, John Wiley & Sons.
2. White, R. R. (2002) *Building the Ecological City*. Cambridge, Woodhead Publishing Ltd. Chapter 4, Cities and the Hydrological Cycle. Pp. 64-77;
3. White, R. R. (2002) *Building the Ecological City*. Cambridge, Woodhead Publishing Ltd. Chapter 7, The Water We Use and Abuse. Pp. 114-128

### Week 5 – October 14

Topic: Water as Resource: Agriculture and Industrial Water Use

Readings:

1. Goklany, I. M, 2002, *Comparing 20th Century Trends in U.S. and Global Agricultural Water and Land Use*. International Water Resources Association Water International, Volume 27, Number 3, Pages 321–329, September 2002.
2. World Business Council for Sustainable Development, 2005. Water Facts and Trends. [http://www.unwater.org/downloads/Water\\_facts\\_and\\_trends.pdf](http://www.unwater.org/downloads/Water_facts_and_trends.pdf)

### Week 6 – October 21

Topic: Mid-Term Test starts at 1 pm EST. Students can take the test within 24 hours but once you log on, you must complete the test within 90 minutes.

There will be a 30-minute lecture at 2.30 pm EST. Topic: Writing Lab on Research Paper

Readings:

1. Making Sense: A Student's Guide to Research and Writing

### Week 7 – October 28

Topic: Guest Lecturer

Readings: TBA

#### Week 8 – November 4

Topic: Management Approaches to Water

Readings:

1. Pahl-Wostl, Claudia, (2007), towards adaptive management of water facing climate and global change, *Water Resources Management*, 21:49–62
2. Brooks, D. B. (2005) Beyond greater efficiency: the concept of water soft paths. *Canadian Water Resources Journal* 30, 1 (Spring 2005). Pp. 1-10.

#### Week 9 – November 18

Topic: Governance of Water Resources

Readings:

1. Peter Rogers and Alan W Hall, TEC Background Paper No. 7. *Global Water Partnership*, 2003.
2. Neda A . Zawahri, Governing The Jordan River System: History, Challenges, And Outlook, *Cleveland State University*

#### Week 10 – November 25

Topic: Water Impacts: Climate Change and Human Health

Readings:

1. Palaniappan, M., Peter H. Gleick, Lucy Allen, Michael J. Cohen, Juliet Christian-Smith and Courtney Smith, 2010 *Clearing the Waters*. UNEP
2. Ross, Nancy (Ed.), *Clearing the Waters*, 2010, UNEP.

#### Week 11 – December 2

Topic: Regeneration of Watersheds: Case-Studies from Around the World

Readings:

1. Chabot, J., R. French, B. Kopperson, G. Rodgers, A. Slaight, H. Van Welter and R. Verma (2006) *The Naked Truth: going behind the science of Lake Simcoe*. Windfall Ecology Center. Pp. 12-63.

#### Week 12 – December 9

Topic: Approaches to Water Financing and Other Emerging Issues

Readings:

1. Feldman, D. W., Water. 2012. Chapter 4, *Who is in Control?* Polity Press, UK.

2. A. Y. Hoekstra · A. K. Chapagain. *Water footprints of nations: Water use by people as a function of their consumption pattern*. Water Resource Management (2006)

## Course Policies & Expectations

### Communication

The main web site for the course is Quercus which will be used for the following:

- Lecture slide repository, assignment instructions, required readings.
- Grades will be posted on the Quercus.

### Accessibility Services

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services as soon as possible:

<http://www.accessibility.utoronto.ca/Contact-Us.htm> and get information about its services at:  
<http://www.accessibility.utoronto.ca/>

### Extension Requests

For students who miss the regularly scheduled assignments, quiz test or final exam, Dr. Verma, [romila.verma@utoronto.ca](mailto:romila.verma@utoronto.ca) must be notified as soon as possible.

To get an extension on assignments, quiz and/or final exam, students must submit Absence Declaration tool on ACORN.

### Medical Certificate & Documentation Supporting Extensions, etc.

The University is suspending the need for a doctor's note or medical certificate for absences from academic participation. Please use the **Absence Declaration tool on ACORN** to declare an absence if you require consideration for missed academic work. You are responsible for contacting your instructors to request the academic consideration you are seeking. Record each day of your absence as soon as it begins, up until the day before you return to classes or other academic activities.

### Reread requests

Students may request rereads of Assignments/Tests through email by stating clearly their concerns about the marks.

### Email Étiquette

You can email the TAs or me directly with your questions and concerns. Emails might not be returned promptly especially during the weekend.

## Academic Integrity

“The University of Toronto treats cases of academic misconduct very seriously. Academic integrity is a fundamental value of learning and scholarship at the UofT. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that your UofT degree is valued and respected as a true signifier of your individual academic achievement. The University of Toronto’s Code of Behaviour on Academic Matters outlines the behaviours that constitute academic misconduct, the processes for addressing academic offences, and the penalties that may be imposed. You are expected to be familiar with the contents of this document. Potential offences include, but are not limited to:

In papers and assignments:

- Using someone else’s ideas or words without appropriate acknowledgement.
- Submitting your own work in more than one course without the permission of the instructor.
- Making up sources or facts.
- Obtaining or providing unauthorized assistance on any assignment (this includes working in groups on assignments that are supposed to be individual work).