

# Water Resource Economics

## ECON 484/673

### Fall 2021 - Course Outline

**Professor:** Roy Brouwer  
**Class time and location:** in person Tuesdays and Thursdays 4:30 – 6:00 pm, room HH 1101  
**Consultation hours:** online appointment Fridays 9:00 – 10:00 am  
**Contact information:** rbrouwer@uwaterloo.ca

#### Course description:

This is a topics course. The course consists of classes in which the economics of major global water management challenges will be addressed, including droughts and water scarcity, climate change and flood risks, water quality management, and the water-food-energy nexus. Particular attention will be paid to water resource valuation and pricing, focusing on market and non-market valuation methods. Students will play a water game, do an intermediate test related to the water game and write an assignment and review paper:

(1) an assignment paper (between 3,500-4,000 words) about a real-world transboundary water management challenge for which empirical data will be made available to conduct a Cost-Benefit Analysis (CBA). The challenge will be detailed in week 4 during the class about CBA. This assignment paper will be presented by the student in class and is due on or before November 9, 2021.

(2) a review discussion paper (between 2,000-2,500 words) about an article of their own choice published in the journal Water Resources & Economics. Students can work on this review paper from the beginning of the course. Once they identified an article of interest, they inform the instructor about the selected article and after the instructor approved the article, they can start reviewing and discussing it. This review paper is due at the end of the course on or before December 2, 2021.

The assignment paper and review discussion paper will each count for 25% of the overall grade. In addition, the test following the water game will count for 20% towards the final grade. The course will end with a final exam, which will make up 30% of the final grade for the course. The exam will be based on the material covered in class.

The course grade will be made at the discretion of the instructor. The guidelines for this are as follows. All components making up the final grade (intermediate test in week 7, assignment paper in week 10, review paper in week 13) are equally graded and weighted across undergraduate and graduate students. Graduate students will be given an extra question in the intermediate test linked to the water game in week 7 and in the final exam.

## Course schedule

Week	Date	Course description	Reading material	Assignment	Weight
1	09/07-09/09	Course introduction & key aspects of water	Olmstead (2010a,b)		
2	09/14-09/16	Supply and demand of water	Griffin, chapter 2		
3	09/21-09/23	Empirical estimation supply & demand	Griffin, chapter 3		
4	09/28-09/30	Cost-benefit analysis (CBA)	Griffin, chapter 7 Brouwer (2021)		
5	10/05-10/07	Water pricing	Griffin, chapter 9		
6	10/12-10/14	<b>Reading week</b>			
7	10/19-10/21	Water game	Seibert and Vis (2012)	Intermediate test	20%
8	10/26-10/28	Watershed cooperation & Payments for Watershed Services	Brouwer et al. (2011)		
9	11/02-11/04	Economic valuation of water	Young, chapter 2		
10	11/09-11/11	Presentation CBA assignment		Submission paper assignment	25%
11	11/16-11/18	Nonmarket valuation methods: revealed preference methods	Young, chapter 4		
12	11/23-11/25	Nonmarket valuation methods: stated preference methods	Young, chapter 4 Brouwer et al. (2010)		
13	11/30-12/02	Recap: what have we learned?		Submission paper review	25%
<b>Final exam</b>					30%

**Required background:** Knowledge of microeconomic theory, basic calculus and linear algebra and some experience with differential equations are required.

**Readings:**

- Brouwer, R., Dekker, T., Rolfe, J. and Windle, J. (2010). Choice certainty and consistency in repeated choice experiments. *Environmental and Resource Economics*, 46, 93-109. <https://doi.org/10.1007/s10640-009-9337-x>
- Brouwer, R., Tesfaye, A. and Pauw, P. (2011). Meta-analysis of institutional-economic factors explaining the environmental performance of payments for watershed services. *Environmental Conservation*, 38(4): 380-392. <https://doi.org/10.1017/S0376892911000543>
- Brouwer, R. (2021). The economics of resource recovery. In: Rabaey et al. (eds.). *Resource Recovery from Water: Principles and Application*. IWA Publishing.
- Griffin, R.C. (2016). *Water resource economics. The analysis of scarcity, policies and projects*. Cambridge, MA, MIT Press, 2<sup>nd</sup> edition.
- Olmstead, S.M. (2010a). The economics of managing scarce water resources. *Review of Environmental Economics and Policy*, 4(2): 179-198. <https://doi:10.1093/reep/req004>
- Olmstead, S.M. (2010b). The economics of water quality. *Review of Environmental Economics and Policy*, 4(1): 44-62. <https://doi.org/10.1093/reep/rep016>.
- Seibert, J. and Vis, M.J.P. (2012). Irrigania – a web-based game about sharing water resources. *Hydrology and Earth System Sciences*, 16:2523-2530. doi:10.5194/hess-16-2523-2012.
- Young, R. (2005). *Determining the economic value of water. Concepts and methods*. Resources for the Future Press. Washington, USA.

## **Economics Department Deferred Final Exam Policy**

Deferred Final Exam Policy found at <https://uwaterloo.ca/economics/undergraduate/resources-and-policies/deferred-final-exam-policy>

### **Cross-listed course**

Please note that a cross-listed course will count in all respective averages no matter under which rubric it has been taken. For example, a PHIL/PSCI cross-list will count in a Philosophy major average, even if the course was taken under the Political Science rubric.

### **Academic Integrity**

**Academic Integrity:** In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility. See the [UWaterloo Academic Integrity](#) webpage and the [Arts Academic Integrity](#) webpage for more information.

**Discipline:** A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to [Policy 71 - Student Discipline](#). For typical penalties check [Guidelines for the Assessment of Penalties](#).

**Grievance:** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. [Read Policy 70 - Student Petitions and Grievances](#), Section 4. When in doubt, please be certain to contact the department’s administrative assistant who will provide further assistance.

**Appeals:** A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 - Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to [Policy 72 - Student Appeals](#).

### **Accommodation for Students with Disabilities**

**Note for students with disabilities:** [The AccessAbility Services office](#), located on the first floor of the Needles Hall extension (1401), collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.