ERS 316: Fall 2017
Urban Water and Wastewater Systems: Integrated Planning and Management
Department of Environment and Resource Studies, University of Waterloo

1. Course Information

Professor:	Sarah Wolfe (EV2 2011; sewolfe@uwaterloo.ca) *I cannot respond to course-related emails between 5pm - 9am.*
Seminar:	Mondays 12:30pm -2:20pm in AL 124
Office Hours:	Wednesdays 2:00-3:00pm in EV2 2011
D2L	Available; class announcements; resources; grades etc
Laptop policy:	Please use your laptops for taking course-related notes during class. Please refrain from surfing, chatting, downloading video, social network sites etc. Research has shown that all students who multi-task during seminars retain less information (Hemebrooke and Gay 2003) and achieve lower final grades (Ellis et al., 2010).

2. Context, Content and Teaching Methods

This is an elective course designed for senior students interested in urban environmental issues, with a focus on urban water services (drinking, waste, safety). Students should have previous knowledge of water issues, for example, ERS 111. This seminar extends concepts learned in ERS 265 (Water History), complements ERS 365 (Water Governance) and is an essential foundation for a senior thesis (ERS 403) or interdisciplinary graduate studies on water issues (WATER 601 or WATER 602).

In this course, we will focus on urban water management in North America, Australia, Western Asia and the Global South using illustrative systems or cases. The underlying premise is that changing climate conditions will increase decision-making uncertainty, the likelihood of extreme events (e.g., urban flooding and drought) and requirements for new, or at least more resilient and flexible, water management approaches. We will examine the core components of urban water and wastewater systems (including their development and maintenance) along with issues of demand and supply management planning, efficiency mechanisms, and socio-environmental equity concerns. Some things you should know:

- Readings are the foundation of this course. Readings must be done BEFORE the assigned class meeting.
- Seminar discussions and guest lectures are designed to provide an overview of key concepts/cases and highlight important ideas from the readings. Don't assume that taking notes in class will mean you don't need the readings.
- The readings, discussions, lectures and video content should be considered as an integrated whole, with each component adding and/or reinforcing key ideas. Virtual field trip(s) provide additional concepts explored in the textbook and in class discussions. Translation: if I included it, it is there for a reason.
- In-class activities are critical to your success because they're designed to extend and reinforce your knowledge foundation (i.e., depth and breadth). You'll need to apply what you've learned from both the seminar notes and readings material to effectively participate in class discussions and activities. This participation will benefit your brain and, overall, your final grade.
- You should take notes in class. Really.

3. Learning Outcomes

By the **end of each week** you will be able to:

1. Articulate and summarize the key concepts from the readings and class lecture and/or discussions.
2. Express the key concepts using different modes to organize and communicate your thoughts.

By the **end of the semester** you will be able to:

1. Identify and describe municipal water and wastewater systems and their subcomponents (*this is your content knowledge*).
2. Explain, using case examples, how climate change influences water management components at an urban/municipal scale (*this is your content + comprehension knowledge*).
3. Assess the benefits and problems associated with water efficiency technologies, techniques in different urban applications, e.g., residential and Industrial-Commercial-Institutional) and contexts, e.g., North America vs. Global South cities (*now you are working at a third-year level: content + comprehension + application knowledge*).
4. Recognize and evaluate the positions, assumptions and conventions within the water management literature by dissecting specific debates, e.g., supply vs. demand paradigms; water pricing and social equity etc. (*if you can do this, you're ready for fourth year courses: content + comprehension + application + analysis and evaluation knowledge*).

4. Required and Recommended Readings

Required Books Available through the UW bookstore or many used copies in circulation.

1. Sedlak, David. Water 4.0. the past, present and future of the world's most vital resource. Chapters 1, 2, 3, 10, 12. **NOTE**: this book is also available as a free e-book the UW library.
2. Yudelson, Jerry (2010). Dry Run: Preventing the next urban water crisis. New Society Publishers.

Required Articles and Chapters These are all available as pdfs through the library course reserve (3 hours).

1. Bilton, Chris (2008). Storm warning: Hurricane Hazel and the evolution of flood control in Toronto. Chapter in: Reeves, W and C. Palassio (Eds). Toronto's water from Lake Iroquois to lost rivers to low-flow toilets. Coach House Books, Toronto, Canada. Pg 82-91
2. Cook, Michael (2008). Water underground: exploring Toronto's sewers and drains. Chapter in: Reeves, W and C. Palassio (Eds). Toronto's water from Lake Iroquois to lost rivers to low-flow toilets. Coach House Books, Toronto, Canada. Pg. 184-203
3. Ellis, Y., Daniels, W. and Jauregui, A. (2010). The effect of multitasking on the grade performance of business students. Research in Higher Education Journal, http://www.aabri.com/manuscripts/10498.pdf
4. Feitelson, E. (2012). What is water: A normative perspective. Water Policy 14, 52-64.
5. Hembrooke, H., & Gay, G. (2003). The laptop and the lecture: The effects of multitasking in learning environments. Journal of Computing in Higher Education, 15(1), 46-64.
6. Goldman, J.L. (2017). Why Smart Cities Are Turning Themselves Into Sponges. Politico Magazine. http://www.politico.com/magazine/story/2017/04/20/innovative-infrastructure-storm-water-system-215055. April 20, 2017
7. Lahey, Jessica (2014). Why Students Should be Tested More, not less. The Atlantic. https://www.theatlantic.com/education/archive/2014/01/students-should-be-tested-more-not-less/283195/. January 21, 2014
8. Williamson, Ronald F. and Robert I. MacDonald (2008). A resource like no other: understanding the 11 000 year relationship between people and water. Chapter in: Reeves, W and C. Palassio (Eds). Toronto's water from Lake Iroquois to lost rivers to low-flow toilets. Coach House Books, Toronto, Canada.

Recommended Book: Hay, Iain and Philip Giles (2010). *Communicating in Geography and Environmental Sciences: Canadian Edition (Paperback).* Oxford University Press. Available at the bookstore.

5. COURSE ASSIGNMENTS

This syllabus is a contract between us: if you have any questions, please speak with me before September 18th 2017.

ASSIGNMENT	VALUE	DATE
In Class Test A (weeks 1, 2 and 3)	25%	October 2, 2017
In Class Test B (weeks 5, 6 and 7)	25%	November 6, 2017
In Class Test C (weeks 9, 10 and 11)	25%	December 4, 2017
Weekly Seminar Presentation and Report, ~ four-person team An opportunity to teach the class (20 minutes maximum) the key concepts from the assigned materials for that week (including lectures). Sign up for one of the seven weeks to present your thoughts and to lead an interactive seminar discussion. Depending on our final class numbers, we may have two groups in Week 7.	25% (10% presentation + 15% report)	Seminar presentation in class on one of the seven available weeks (see Course Plan) The Team's report due the DAY AFTER class by 12pm emailed to Sarah Wolfe as a .docx file).

6. COURSE PLAN and READINGS SCHEDULE

Week	Objectives - **skills** - **concepts**	Weekly Content
Week 1 (Sept 11)	*Learning Logistics* Context Knowledge	1. Admin and course review: context, structure, readings, assignments, classroom logistics etc 2. Seminar Concept(s): urban water history 3. Readings: Ellis et al., (2010); Hemebrooke and Gay (2003); Lahey (2014); Sedlack Chapter 1 and Chapter 2; Williamson and MacDonald (2008)
Week 2 (Sept 18)	Context Knowledge	1. Seminar Concept(s): components of urban water and wastewater infrastructure 2. *Virtual Fieldtrip: Liquid Assets: urban water management and infrastructure* 3. Readings: Yudelson Chapter 4
Week 3 (Sept 25)	Problem Identification	1. Seminar Concept(s): patterns and crises in urban water use *(first half of class)* 2. Activity: seminar, presentation and discussion *(#1 – second half of the class)* 3. Readings: Yudelson Chapters 2 and 3
Week 4 (Oct 2)	*Learning Assessment*	**In Class Test A (Weeks 1, 2 and 3)**
Thanksgiving Holiday October 9; Fall Break October 10-11, 2017		
Week 5 (Oct 16)	Core Components + Urban Cases	1. Seminar Concept(s): blue and grey water 2. Activity: seminar, presentation and discussion (#2 – *first half of the class*) 3. *Guest: Peter Clark, Region of Waterloo water treatment (second half of class)* 4. Readings: Feitelson (2012); Sedlack Chapter 10; Yudelson Chapters 7 and 8

Week 6 (Oct 23)	Core Components + Urban Cases	1. Seminar Concept(s): brown and black water 2. Activity: seminar, presentation and discussion (#3 – *first half of the class*) 3. *Guest: Trevor Brown, Region of Waterloo wastewater management (second half of class)* 4. Readings: Sedlack Chapter 3; Yudelson Chapters 9 and 10
Week 7 (Oct 30)		1. Seminar Concept(s): green water and 'new' water supplies 2. Activity: seminar, presentation and discussion, 2 groups (#4 – *first half of the class*) 3. Readings: Bilton (2008); Cook (2008); Goldman (2017); Yudelson Chapters 11 and 13
Week 8 (Nov 6)	*Learning Assessment*	**In Class Test B (Weeks 5, 6 and 7)**
Week 9 (Nov 13)	Option Identification & Prioritization + Urban Cases	1. Seminar Concept(s): Key concepts of residential water efficiency 2. Activity: seminar, presentation and discussion (#5 – *second half of the class*) 3. Readings: Yudelson Chapter 6
Week 10 (Nov 20)		1. Seminar Concepts: Industrial, Commercial and Institutional (ICI) water efficiency *2.* Activity: seminar, presentation and discussion (#6 – *first half of the class*) *3. Guest: Dan Meagher, Region of Waterloo efficiency programing (second half of class)* 4. Readings: Yudelson Chapter 5
Week 11 (Nov 27)		1. Seminar Concept(s): Preventing the next urban water crisis 2. Activity: seminar, presentation and discussion (#7 – *second half of the class*) 3. Readings: Readings: Sedlack Chapter 12; Yudelson Chapter 15
Week 12 (Dec 4)	*Learning Assessment*	**In Class Test C (Weeks 9, 10, 11)**

7. THE STUDENT'S RESPONSIBILITIES

As a student at the University of Waterloo, you have the following responsibilities. Contact me to discuss any concern you have regarding your responsibilities as outlined here.

Communication: It is your responsibility to check the course web page for information and updates. Also, as per university regulations, e-mail is the official route of communication between the University and its students. You are required to check your uwaterloo.ca e-mail account regularly (at least once per day). If you use another e-mail service, it's your responsibility to ensure that mail sent to your university account is forwarded.

When You Cannot Meet a Course Requirement: When you find yourself unable to meet an in-course requirement because of medical, psychological or compassionate reasons, please advise me in writing (preferably by e-mail), with your name, student ID number, and e-mail contact information. Where possible, this should be done in advance of the assignment due date, but otherwise as soon as possible after the due date. As a rule, you

must provide appropriate documentation, for example, a note from your doctor indicating the dates during which you were ill,
and describing the severity of your illness. You are required to attend (and participate in) all of the class meetings and field trips. Assignments must be submitted in D2L on the designated day and time.

Manage your time carefully: Pressure of work alone is not an acceptable reason for seeking an extension without penalty. See the undergraduate calendar for additional information on regulations and procedures for Academic Consideration.

8. ACADEMIC INTEGRITY

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. www.uwaterloo.ca/academicintegrity/. Students who are unsure what constitutes an academic offence are requested to visit the on-line tutorial at: http://www.lib.uwaterloo.ca/ait/

Research Ethics: Please also note that the 'University of Waterloo requires all research conducted by its students, staff, and faculty which involves humans as participants to undergo prior ethics review and clearance through the Director, Office of Human Research and Animal Care (Office). The ethics review and clearance processes are intended to ensure that projects comply with the Office's Guidelines for Research with Human Participants (Guidelines) as well as those of provincial and federal agencies, and that the safety, rights and welfare of participants are adequately protected. The Guidelines inform researchers about ethical issues and procedures which are of concern when conducting research with humans (e.g. confidentiality, risks and benefits, informed consent process, etc.). If the development of your research proposal consists of research that involves humans as participants, the please contact the course instructor for guidance and see:
www.research.uwaterloo.ca/ethics/human/

Note for students with disabilities: The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, 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 OPD at the beginning of each academic term.

Religious Observances: Please inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

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, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt, please contact your Undergraduate Advisor for details.

Discipline*:* A student is expected to know what constitutes academic integrity, to avoid committing academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (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. For information on categories of offences and types of penalties, students should

refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties, check Guidelines for Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm

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). See: www.adm.uwaterloo.ca/infosec/Policies/policy72.htm

Consequences of Academic Offences:

A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (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,

Within ENV, those committing academic offences (e.g. cheating, plagiarism) will be placed on disciplinary probation and will be subject to penalties which may include a grade of 0 on affected course elements, 0 on the course, suspension, and expulsion.

Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy #70, Student Grievance,

ENV students are strongly encouraged to review the material provided by the university's Academic Integrity office (see: http://uwaterloo.ca/academicintegrity/Students/index.html).