

**Course Syllabus – DRAFT**

**ISEN 470 – Sustainability in Water and Wastewater**  
Spring 2020 (normally offered in Fall Quarter)

**Northwestern University**

**Office Hours:** By appointment

**Site Visits:** The class will aim to visit at least 1-2 water related facilities including the City of Evanston Water Treatment plant on Lincoln Avenue<sup>1</sup>. Additional field visits will be confirmed with / arranged by the instructor.

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**Course Synopsis:** This class will provide an introduction to the economics, technology and regulation that drive water and wastewater markets. As a 5-week class, this is a survey of the major issues that exist and a discussion of opportunities to drive to more sustainable water systems.

**Course Goals:** Students will build a foundation in:

- Key Concepts & Terminology in the water and wastewater industry
- The basic science of water systems (high level) and critical components of the water “supply chain”
- Primary stakeholders in water systems at the global and US market levels – including providers of water / wastewater services, regulators and end users
- Major trends and issues in water systems (globally, but deeper dive in N. America)
- Emerging technology / policy / business model innovation in water
- Key questions, measurements, tools & resources to be used when considering water sustainability

Students interested in any sort of sustainability, manufacturing, food or water disciplines should strongly consider this course. It will offer basic literacy in the water issues of our day and will help students identify areas for further study given their interests or career path.

This course will require an ability to understand basic scientific concepts (hydrologic cycle and its connection to climate), technical solutions to drive water efficiency / sustainability and a basic understanding of government to internalize the regulatory environment but in general there are no prerequisites. As many students will not have deep knowledge of water systems and sustainability topics, the reading list is significant. Students are expected to complete readings prior to class. Please refer to the reading list for primary texts that will be used for the class. There will also be supplemental readings, including articles and essays, that will be provided by the instructor.

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<sup>1</sup> [dking@cityofevanston.org](mailto:dking@cityofevanston.org) has been contacted in October 2019 to arrange Spring 2020 visit

As part of the class, we will have a series of guest panels and lectures by business professionals from a variety of stakeholders that work in the sustainability field. Particular focus will be placed on the practical reality of how to assess and implement solutions in water.

**Grading/Assessment:**

Grading will be based on the following rubric:

Component	Weight	Details	Due
Case Write Ups	40%	Two write ups on key questions from case studies to answer key questions.  <i>*Write ups should be turned in before class discussion on the case</i>	Week #2, 4
Final Paper	40%	Final paper (~8-10 pages) that covers the assessment of a future challenge/opportunity in water or wastewater. The paper should assess the topic from the point of view of: end users, businesses / utilities, government/regulators and technologists	End of course
Preparation & Participation	20%	Based on attendance and instructor assessment of preparation and participation in class on a weekly basis	Ongoing

**Grading Policy:**

- Grades will be assigned based on all the work you have completed during the semester following the traditional practice of A=90-100, B=80-89, C=70-79, D=60-69, F<60.

**Course Readings:**

The following texts are required for the class. Instructor will specify if only portions of the books are to be read. Other articles and essays will be distributed in class.

- Barlow, Maude. Blue Future: Protecting Water for People and the Planet Forever. January 7, 2014.
- Bates, B.C., Z.W. Kundzewicz, S. Wu and J.P. Palutikof, Eds., 2008: Climate Change and Water. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, 210 pp.
- Fishman, Charles. The Big Thirst: The Secret Life and Turbulent Future of Water. Feb 14, 2012

- Debaere, P.; Richter, B. The Nature Conservancy: Advocating for and Investing in Sustainable Water Management, Case GEM-0123, 2014.

### Supplemental Reading List

- Debaere, P.; Richter, B. Securing a City's Future Water Supply: Building a Reservoir in Charlottesville, Virginia, Case GEM-0115, 2013.
- Buchholz, H.; Environmental Compliance Water, Corporate QEHS L'Oréal Recycling and reuse of treated industrial wastewater in cosmetics operations, 2017.
- Euler, J. Water reduction and reuse in a P&G Beauty Care manufacturing facility, wbcSD, 2017.
- Mianzan, A; Environment Manager Water and Green Infrastructure; Shell Global Solutions Reusing and recycling water in Australia, wbcSD, 2017.
- Holbrook, E. Levi Strauss & Co. Sets Goal of Reducing Water use 50% by 2025, August 2019.
- WaterSense Hospital Installs Water-Efficient Laboratory and Medical Equipment, EPA, July 2014.
- Reavis, C.; Zuckerman, E. Resolute Marine Energy: Power in Waves, MIT Sloan Management, September 2013.
- WaterSense Texas Hotel Upgrades to Four-Star Water Efficiency, EPA, July 2014.
- WaterSense California Campus Cooks Up Kitchen Water Savings, EPA, July 2014.

### Video Viewings

Throughout the quarter, students will be required to view videos outside of class time. Videos are available online.

- Al-Attiya, F. [A country with no water](https://www.ted.com/talks/fahad_al_attiya_a_country_with_no_water), TED talk, 2012<sup>2</sup>
- Video: <https://www.youtube.com/watch?v=Zcfp0L0EWEM>

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<sup>2</sup> [https://www.ted.com/talks/fahad\\_al\\_attiya\\_a\\_country\\_with\\_no\\_water/transcript](https://www.ted.com/talks/fahad_al_attiya_a_country_with_no_water/transcript)

**CLASS OUTLINE**

Weekly Topic	Description
<b>1: History &amp; fundamentals of water management</b>	<ul style="list-style-type: none"> <li>• Water and wastewater: A system overview</li> <li>• Economic, technological and policy basics of water</li> <li>• Fundamental concepts in water, sanitation, and hygiene (WASH)</li> <li>• Global view of water &amp; translation into N. American systems</li> </ul>
<b>2: Sustainability as applied to WWW</b>	<ul style="list-style-type: none"> <li>• Definition of sustainable water</li> <li>• Key measures, risks and opportunities in water / wastewater sustainability</li> <li>• Role of regulation, financing, physical delivery, and research designs on sustainability</li> <li>• Overview of decisions that shape and influence the accessibility, affordability, adequacy of water and sanitation services</li> <li>• Outline of specific N. American and global risks in WWW</li> </ul> <p><i>Case Study A</i></p>
<b>3: Impacts of WWW</b>	<ul style="list-style-type: none"> <li>• Environmental Impacts</li> <li>• Cost to improve WWW sustainability</li> <li>• Benefits of sustainable water</li> <li>• Role of water resource planning</li> </ul>
<b>4: Stakeholders &amp; their role</b>	<ul style="list-style-type: none"> <li>• Government</li> <li>• Non-Profit</li> <li>• Corporates</li> <li>• Consumers</li> </ul> <p><i>Case Study B</i></p>
<b>5: Driving to Sustainable WWW</b>	<ul style="list-style-type: none"> <li>• Measurements</li> <li>• Incentives</li> <li>• Politics</li> </ul> <p><i>Final Paper Due</i></p>

There will be no final exam for this class but final papers will be due on scheduled final exam date.

**Northwestern University Policies & Resources:**

***Academic Integrity***

*Academic integrity is taken very seriously at Northwestern. Students are responsible for reading and understanding Northwestern's Academic Integrity policies. All suspected violations will be reported to the McCormick College of Engineering's Dean's Office. These include: cheating, plagiarism, fabrication, unfair advantage, unauthorized collaboration, and aiding and abetting of academic dishonesty. Students found in violation of academic integrity may receive a zero on the assignment or a failing grade for the course, and may be suspended or permanently expelled from the University. See [Academic Integrity: A Basic Guide](#) for more information.*

***AccessibleNU and Disability Accommodations***

*Any student requesting accommodations related to a disability or any other condition is required to register with AccessibleNU (847-467-5530) and provide professors with an accommodation notification from AccessibleNU, preferably within the first two weeks of class. All information will remain confidential. See the [AccessibleNU website](#) for more information.*

***Illness and Medical Leave of Absence***

*Review the University's [policy](#) on missing academic work due to illness. Your instructor cannot waive an assignment missed due to illness unless she can verify your illness with Health Services.*

***Discrimination and Sexual Harassment***

*Northwestern's Policies on Discrimination, Harassment, and Sexual Harassment apply to all members of the University community, including students, staff, faculty, and third parties. Any student, staff, faculty member, or third party who believes that they have been discriminated against or harassed on the basis of their race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, pregnancy, parental status, marital status, age, disability, citizenship, veteran status, genetic information or any other classification protected by law, should contact the Office of Equity at (847) 467-6571. Additional information about the University's discrimination and harassment policies, including the campus resources available to assist individuals with discrimination or harassment concerns, is available online on the [Office of Equity Website](#). Students, staff, and faculty who report harassment, discrimination, or sexual misconduct are also protected under the [University's Policy on Non-Retaliation](#).*

***Sexual Misconduct and Reporting***

*Northwestern University is committed to fostering an environment where students are safe and free from sexual misconduct. [Confidential resources](#) are available to those who have experienced sexual misconduct. Faculty and instructors are not confidential resources and are required to report incidents of sexual misconduct, whether discussed in your assignments or in person, to the Office of Equity, which can provide information about resources and options. We encourage students who have experienced sexual misconduct to talk with someone to get support. For more information, including how to request interim protective measures and academic accommodations or file a complaint, see the [Get Help page](#).*

***Other Resources***

*Students can find useful resources for safety and security, academic support, and mental and physical health and well-being at the [NUhelp website](#).*