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ENST489Z Water Management in Urban Environment

ENST489Z is a new course that is being designed for upper level undergraduate students for the academic year 2015-16. In this course we aims at teaching students how to develop frameworks for planning, designing, and managing urban water systems, evaluate their performance, and assess tradeoffs between multiple objectives. In ENST489Z, the main goal is to provide the students with basic knowledge of urban water management. During the class we will explore urban water supply, wastewater, and stormwater systems in an integrated manner. I will also teach students the urban water balance and consequences of urbanization on surface and groundwater regimes.

In this course, I describe the new approach to supplying and managing water and resource infrastructure to achieve urban sustainability. Examples of system components are also identified, as are challenges to implementing higher performing systems. Water supply, wastewater, and stormwater systems are explored in this course, first individually and then looking at them in an integrative manner.

The concept of sustainability is a core component of this course. We will explore the new approach to supplying and managing water and resource infrastructure to achieve urban sustainability. Examples of system components are also identified, as are challenges to implementing higher performing systems. Sustainable urban water management differs from the historical approach in several respects. First, water-supply options today include not only imported surface and groundwater, but also locally collected rainwater and recycled water. Second, all used water is reused, either to meet water-supply needs or to enhance and restore the environment. Finally, the waste stream (used water) is no longer viewed as a necessary “evil” that must be managed to minimize harm. Instead, it is considered a resource from which useful products can be extracted. Heat can be extracted directly. Organic matter can be removed and used for energy production and the production of soil-conditioning products. Nutrients can also be extracted and re-used.

Application of sustainability principles to urban water systems yield the following principles. These principles have been considered while developing the course syllabus.

1. Minimize the distance of water and wastewater transportation.
2. Use stormwater from roofs, preferably for water supply, instead of infiltrating or discharging it.
3. Do not mix the human food cycle with the water cycle. Do not mix waste waters of different origin.
4. Decentralize urban water systems and do not allow human activities with water if local integration into the water cycle is not possible.
5. Increase the responsibility of individual humans for their impacts on local water and wastewater systems.