E4: Urban Water

Instructors: Veena Srinivasan (coordinator: veena.srinivasan@atree.org), Priyanka Jamwal, Shrinivas Badiger
Credits: 2 credits (32 contact hours)

Duration of the course: 26th September – 28th November 2014

Time and Days: 2:00 – 3:50 PM on Tuesdays and Fridays

Course Description

300 million Indians currently live in towns and cities. Within 20-25 years, another 300 million people will get added to Indian towns and cities. This urban expansion will happen at a speed quite unlike anything that India has seen before. Yet, there is very little understanding of how this urbanization will impact water resources. Urban hydrology as traditional taught in the Western World, tends to focus narrowly on storm water management – inter-linkages between wastewater, urban groundwater and urban storm water are not explored. In this class, we hope to offer a set of tools that could help young researchers' frame and study urban hydrology.

In the first half of the course, we will explore the physical principles that govern the urban water cycle including groundwater flow, storm water flow as well as infrastructural design. In the second half of the course, we will explore topics in water quality including urban pathogens, toxics their effects on urban environments and ecosystems.

The course will help students "learn by doing" a study of one urban lake in Bangalore via a group class project. Students will map the Rajakaluves, test the sources of water flowing into the lake during wet and dry periods and learn to develop a water and nutrient balance. Knowledge of basic calculus and chemistry is recommended.

Session format

This course will involve "learning by doing" and will therefore involve both HW Assignments and a class Project. It will be taught in 2-hour sessions. Each session will have readings assigned to it, and these will form the basis for class discussion.

Course assessments:

1. Four homework assignments (20% of total marks)
2. Mid-term Exam (20%)
3. Final Exam – Open Book (35%)
4. Class Project Presentation (20%)

Session-wise time-table

#	Date	Title	HW Assignments	Instructor
1	26-Sep-2014	Introduction to Urban Hydrology Course		All
URBAN HYDROLOGY				
2	07-Oct-2014	Urban Hydrology – Basics (SCS Curve Number, Runoff, Infiltration etc.)		SB
3	10-Oct-2014	Urban Flooding and Vulnerability	HW 1	SB
5	14-Oct-2014	Urban Groundwater		VS
URBAN INFRASTRUCTURE				
4	17-Oct-2014	Storm Water Management (Pipes, culverts)	HW 2	VS
6	21-Oct-2014	Water Supply and Distribution		VS
7	28-Oct-2014	Urban water sanitation and sewage	HW 3	VS
8	31-Oct-2014	Mid-term Exam		All
URBAN WATER QUALITY				
9	04-Nov-2014	Urban Hydrological Systems Basics		VS/PJ
10	07-Nov-2014	Water Quality and the Environment		PJ
11	11-Nov-2014	DO and Pathogens in urban environments	HW 4	PJ
12	14-Nov-2014	Urban Ecosystems – Eutrophication etc.		PJ
13	18-Nov-2014	Understanding urban ecosystems		PJ
14	21-Nov-2014	Toxics in urban environments	HW 5	PJ
15	25-Nov-2014	Wrap up Session		All
16		Project Presentations		All
17		FINAL EXAM		

Reference Materials:

Text Books:

1. Urban Hydrology by Timothy Lazaro. CRC Press; Rev Sub edition (March 12, 1990)

Readings: