School of Engineering
University of Guelph
URBAN WATER SYSTEMS DESIGN
ENGG*4370

Course Outline – Fall 2009

Calendar Description:
Estimation of water quantity and quality needed for urban water supply and drainage. Design of water supply, pumping systems, pipe networks and distributed storage reservoirs from analysis of steady and transient, pressurized and free surface flow. Rates of generation of flows and pollutants to sanitary and storm sewers, design of buried pipe and open channel drainage systems with structures for flow and pollution control. Modelling of water systems for sustainable urban development.

Prerequisites:
Prerequisites: ENGG*2230, ENGG*3650

Objectives:
At the successful completion of this course, the student will have demonstrated the ability to:

(i) Apply the laws of conservation of mass, energy and momentum to the analysis of hydraulic conditions in pipes flowing full or partially full
(ii) Apply knowledge of design considerations and employ software to design water distribution and wastewater collection systems
(iii) Translate an understanding of the effects of urbanization on the urban hydrologic cycle to specification of stormwater management requirements
(iv) Utilize knowledge of a broad suite of stormwater management alternatives to perform preliminary screening given design constraints and criteria
(v) Integrate preventative design techniques into engineering solutions.

Faculty:
Andrea Bradford, PhD., P.Eng.
Room 1342, Thornbrough Building.
Office Hours: please arrange an appointment by email
e-mail: abradfor@uoguelph.ca

Teaching Assistants: Jenn Drake, jdrake@uoguelph.ca Office Hours: Monday 2:30-4:30
Farshid Sabouri, fsabouri@uoguelph.ca

Class Times and Locations:

Lectures	Monday	11:30 – 12:20	Room 225 MACK
	Wednesday	11:30 – 12:20	Room 225 MACK
	Friday	11:30 – 12:20	Room 225 MACK
Tutorial	Tuesday	14:30 – 16:20	Room 2313 THRN

Note: A lecture is also scheduled Thursday, December 3rd (make up day for Thanksgiving Monday).

Text:
Chin, D.A., 2006. *Water-Resources Engineering.* 2nd Edition. Prentice Hall. 962 pp.

Courselink/D2L:
Some of lecture material will be made available. Links to other resources will be provided.

Course Organization:

Lectures will be organized in four modules as outlined below. Computer models – EPASWMM and EPANet – will be introduced during tutorial periods.

Module 1: Introduction to Stormwater Management

- effects of urbanization
- stormwater management objectives, design criteria and approaches
- overview of alternative stormwater management practices
- better site design, low impact development, pollution prevention
- screening design alternatives/constraints
- hydrology review – precipitation and abstractions, rational method

Module 2: Water Distribution Systems

- hydraulics review – pressurized pipe flow
- example problems
- design flows
- water distribution design considerations
- design of storage facilities
- water quality

Module 3: Stormwater Management Systems Design

- lot level controls – infiltration trenches, permeable pavement, bioretention, green roofs
- open channel hydraulics review
- bioswales
- reservoir routing review
- wet ponds and wetlands
- curbs and gutters, inlets
- stormsewers
- cold climate design
- construction and maintenance

Module 4: Wastewater Collection Systems

- hydraulics review – partial pipe flow
- wastewater design flows
- design considerations
- example problem

Evaluation:

Stormwater Management Test	-	10%
Water Distribution Test	-	15%
Design Project	-	50%
Final Exam	-	25%

Tests:

Stormwater Management Test:

Monday, September 28, 2009. 11:30 am - 12:20 pm. MACK 225

Water Distribution Test:

Tuesday, October 20, 2009. 2:30 pm - 4:20 pm. 2313 THRN

Design Project:
The University campus has been divided into blocks predominantly covered by buildings and parking areas. Each team of 4 students will design an LID retrofit for one block. Designs will be completed and shared with other groups by week 8 of the 12 week semester, with subsequent weeks devoted to modelling and assessment of the collective system.

Important Project Dates:
Preliminary Report due: **Wednesday, October 7, 2009. 11:30 am.**
Design Submission / Interim Report due: **Friday, November 6, 4:00 pm.**
Final Report due: **Friday, November 27, 2009. 4:00 pm.**
Reflective Self and Peer Evaluation due: **Thursday, December 3, 2009. 4:00 p.m**.

Final Examination
The final examination is scheduled for Wednesday December 16, 2009. 11:30 – 1:30.

Assignments
Some problems will be provided to assist students in achieving the learning objectives for the course. These will not be submitted and no grade will be assigned for their completion.

Field Trip
- Tuesday, September 29, 2009, Time to Be Confirmed

Please Note:
The Regulations concerning Academic Misconduct as outlined in the University of Guelph, Undergraduate Calendar for 2009-2010 will be strictly enforced.

Disclaimer:
The instructor reserves the right to change any or all of the above in the event of appropriate circumstances, subject to University of Guelph Academic Regulations.