

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

Course Outline – Fall 2007

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:

Students who successfully complete this course 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 pipes and channels flowing 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:

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Teaching Assistants: TBA

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	13:30 – 15:20	Room 2313 THRN

Text:

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

Blackboard:

Some of the overheads and slides presented in lectures will be made available. Links to other resources will be provided.
<http://courselink.uoguelph.ca/ce6courselink/index.html>

Resources on Reserve at Library:

American Society of Civil Engineers and the Water Environment Federation. 1992. *Design and Construction of Urban Stormwater Management Systems*. ASCE Manuals and Reports of Engineering Practice No. 77. WEF Manual of Practice FD-20. 724 pp.

Water Environment Federation and the American Society of Civil Engineers. 1998. *Urban Runoff Quality Management*. 259 pp.

American Society of Civil Engineers and Water Environment Federation, 1982. *Gravity Sanitary Sewer Design and Construction*. 275 pp.

O'Connor, Dennis R., 2002. *Report of the Walkerton Inquiry: Part Two: A Strategy for Safe Drinking Water*. Ontario Ministry of the Attorney General. 588 pp.

Ontario Ministry of the Environment and Toronto and Region Conservation, 2001. *Stormwater Pollution Prevention Handbook*. Prepared by Totten Sims Hubicki Associates, Donald G. Weatherbe Associates and Elizabeth Leedham.

Ontario Water Works Association, 1999. *Water Efficiency: A Guidebook for Small & Medium-sized Municipalities in Canada*.

Course Organization:

Module 1: Introduction (about 2 lectures)

- course overview / design project overview
- urban hydrologic cycle
- institutional/legislative context
- preventive design/management

Module 2: Water Distribution Systems (about 8 lectures)

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

Module 3: Wastewater Collection Systems (about 7 lectures)

- hydraulics review – open channel flow
- wastewater design flows
- design considerations
- example problem

Module 4: Stormwater Management (about 14 lectures)

- major/minor systems
- screening design alternatives/constraints
- urban hydrology review
- lot level controls
- conveyance controls
- end-of-pipe controls
- cold climate design
- maintenance and monitoring

Wrap-up (about 4 lectures)

- challenges/emerging issues
- design presentations

Evaluation:

Problem sets	-	no grade
Mid-term exam	-	40% or 0%
Design Project		
Products	-	40%
Process	-	20%
Final Examination		0% or 40%

Note 1) The Final Examination is optional for any student who obtains a mark of 50 or more out of 100 on the Mid-term examination. The examination portion of the composite mark will be based on the Mid-term mark unless the student has written the Final Examination and obtained a mark higher than on the Mid-term.

2) A student who does not obtain a passing mark (50 or above out of 100) on the Mid-term examination must write the Final examination. Any student who has a mark less than 50 out of 100 on both Midterm and Final examinations will be assigned, as the mark for the course, the mark obtained on the Final examination.

Problem Sets:

Assignments will be given throughout the semester. They will not be submitted and no grade will be assigned for their completion. You are responsible for the material covered by these assignments and this material will appear on examinations

Mid-term Exam:

Tuesday October 23, Tutorial Period.

Design Project:

The design project involves design of water distribution, wastewater collection and stormwater management systems for a residential subdivision. The project will be done by design teams. Evaluating only the products of your design project does not emphasize the importance of developing your transferable design skills. Therefore, individual and collective design competencies such as communication, project management, consensus building and leadership will also be evaluated.

- Proposal due: **Friday, September 28, 4:00 p.m.**
- Water Supply and Distribution Report due: **Wednesday October 24: 4:00 p.m.**
- Progress meetings will be scheduled during Week 7 of the term (Week of October 29, 2007).
- Sanitary Sewer Report due: **Friday, November 9, 4:00 p.m.**
- Stormwater System Report due: **Friday November 30, 4:00 p.m.**
- Presentations on the stormwater report will be scheduled during the final week of classes.
- Logbooks are due: **Friday, November 30, 4:00 p.m.**

Please Note:

The Regulations concerning Academic Misconduct as outlined in the University of Guelph, Undergraduate Calendar for 2006-2007 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.