

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

Course Outline – Fall 2011

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 Assistant: Peter Dekker, pdekker@uoguelph.ca Office Hours: TBD

Class Times and Locations:

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| Lectures | Monday | 3:30 - 4:20 | Room 121 MACK |
| | Wednesday | 3:30 - 4:20 | Room 121 MACK |
| | Friday | 3:30 - 4:20 | Room 121 MACK |
| Tutorial | Tuesday | 13:30 – 15:20 | Room 2313 THRN |

Note: Lecture also scheduled Thursday, December 1st (make up day for Thanksgiving Monday).

Scheduled classes will be the principal venue to provide feedback on tests and assignments and to answer questions on modeling and the project. Students are welcome to email questions in advance of class meetings.

Students engaged in lectures and tutorials, and who have made an effort to keep up with the course material, will be given priority for access to the instructor and TA outside of scheduled course meetings. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed so that consideration may be given if appropriate.

Course Organization and Proposed Schedule (subject to adjustment):

| Week | Lecture Content | Design Tutorial | Important Dates |
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| 1 F, M, T,W | Course Outline Hydraulics for Water Distribution Systems | Introduction to EPANet | |
| 2 F, M, T,W | Design Considerations for WDS Water Network Analysis, Quality, Storage Facilities | EPANet Practice Tutorial | |
| 3 F, M, T,W | Open Channel Hydraulics Review Partial Pipe Hydraulics WW Design Considerations | EPANet Practice Tutorial | Assignment 1: WDS Due: Fri, Sept. 23 |
| 4 F, M, T,W | Sanitary Sewer Design Example Corrosion | EPANet Test | Test 1: Tues Oct. 4, 1:30-3:30 pm (during tutorial) |
| 5 F, T, W, F | Laws and Regulations Hydrology Review/Urban Hydrology Gutter, Inlet, Storm Sewer Design | FIELD TRIP Handout Hydrology Review | |
| 6 M, T, W, F | Effects of Urbanization Stormwater Management (SWM) Objectives Overview of SWM Practices | Introduction to EPASWMM / EPA SWMM Runoff | Test 2: Monday, Oct. 17 (during class and potentially a take home question) |
| 7 M, T, W, F | Overview of SWM Practices Cont'd <i>Better Site Design, Pollution Prevention</i> Screening Level Design Design Criteria | EPA SWMM Conveyance | Project – Pre-development Model: Due Fri. October 28 |
| 8 M, T, W, F | Ponds/Wetlands Wet Pond Design/Routing Pond Routing Example | EPA SWMM Detention Ponds / Continuous Simulation | Test 3: Fri. Nov. 4 |
| 9 M, T, W, F | Lot-level Controls Infiltration Design Bioswale/Bioretenion Design | | Project – Existing Condition Model: Fri. Nov. 11 |
| 10 M, T, W, F | Feedback on Test 3 LID Design Cont'd Guest Lecturer: Pipe Products | EPA SWMM LID | Assignment 2: LID Design Due: Fri. Nov. 18 |
| 11 M, T, W, F | Guest Lecturer: Pipe Products Wed. Nov 23 Writing Workshop for Project Reports Dual Conveyance Systems | | Assignment 3: Extended Detention Pond Design Due: Fri. Nov. 25 |
| 12 M, T, W, Th | Combined Sewers and CSOs Integrated Urban Water Management | | Project – LID Retrofit Model: Due Thurs. Dec. 1 |
| Project Report Due | | | Monday, Dec. 12 |

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 Evaluation:

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| Assignments | 15% |
| Tests | 45% |
| Project | 40% |

Please Note:

The Regulations concerning Academic Misconduct as outlined in the University of Guelph, Undergraduate Calendar for 2011-2012 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.