ENGG*4370 Urban Water Systems Design
Fall 2016

School of Engineering

(Revision 0: August 12, 2016)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Andrea Bradford, Ph.D., P.Eng.
Office: THRN 1342, ext. 52485
Email: abradfor@uoguelph.ca
Office hours: Please arrange an appointment by email

1.2 Lab Technician

Not Applicable

1.3 Teaching Assistants

GTA	Email	Office Hours
Ryan Osman	aosman@mail.uoguelph.ca	Tutorials Only
Akul Bhatt	akul@mail.uoguelph.ca	Tutorials Only

2 LEARNING RESOURCES

2.1 Course Website

Course material, news and announcements will be posted to the ENGG*4370 Courselink site. You are responsible for checking the site regularly. Most lectures will be conducted using a document camera or computer projector. Selected lecture notes will be provided on Courselink but students are expected to provide further annotation and may need to take full notes on some topics.

2.2 Required Resources

There are no required resources for this course.

2.3 Recommended Resources

1. Chin, D.A., 2013. *Water-Resources Engineering*. 3rd Edition. Prentice Hall. 962 pp OR custom textbook that includes selected chapters from Chin, 2013.

2.4 Additional Resources

Will be provided as needed.

2.5 Communication & Email Policy

Please use lectures and lab sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. **It is your responsibility to check the course website regularly.** As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

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3 ASSESSMENT

3.1 Dates and Distribution

Test 1: 20%

(Monday, September 26, 8:30 - 10:20 am, THRN 2313 **OR**

Wednesday, September 28, 8:30 - 10:20 am, THRN 2313) **AND**

Tuesday, October, 4, 1:00 – 2:20 pm, **RICH 2529**

Test 2: 20%

Tuesday, November 22 AND Thursday, November 24, 1:00 – 2:20 pm (in class), **RICH 2529**

Project: 60%

Proposal (5%): Document and Model Files: Tuesday, October 25, 8:00 am

Proposal reviews (2%, required to receive proposal grade): Sunday, October 30, 11:59 pm

Report on Traditional Design (20%): Document and Model Files: Tuesday, November 15, 8:00 am

Report reviews (5%, required to receive report grade): Sunday, November 20, 11:59 pm

Presentation - LID Design, Simulation and Evaluation (23%): Model Files: Sunday, December 4, 11:59 pm

Presentations to be scheduled Week of December 5

Presentation reviews (5%, required to receive presentation grade): Day of Presentations, 11:59 pm

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Passing grade: In order to pass the course, students must obtain a grade of 50% or higher.

Missed tests: If you miss a test with grounds for academic consideration or religious accommodation, contact the instructor as early as possible to arrange a time to write a make-up test.

Late Reports: Late submissions will not be accepted.

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4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 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.

Prerequisite(s): ENGG*2230, ENGG*3650

4.2 Course Aims

The main goals of this course are (1) to learn to apply knowledge of hydrology and hydraulics to design of urban water systems; (2) to gain competence using software in the design and evaluation of urban water systems; and (3) to improve ability to clearly and concisely communicate the findings and implications of an engineering analysis.

4.3 Learning Objectives

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

1. Apply the laws of conservation of mass, energy and momentum to the analysis of hydraulic conditions in pipes flowing full or partially full
2. Apply knowledge of design considerations and employ software to design water distribution and wastewater collection systems
3. Translate an understanding of the effects of urbanization on the urban hydrologic cycle to specify stormwater management requirements
4. Apply knowledge of a broad suite of stormwater management alternatives to perform preliminary screening given design constraints and criteria
5. Integrate preventative design techniques into engineering solutions.

6. Design a stormwater management system to meet design criteria.
7. Evaluate a stormwater management system design using simulation software.
8. Concisely and articulately communicate the results of an evaluation of a stormwater management system design, as well as the relevance and implications of the results.

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1, 2, 4, 5	Tests, Project
2. Problem Analysis	-	-
3. Investigation	7, 8	Project
4. Design	2, 3, 4, 5, 6, 7, 8	Tests, Project
5. Use of Engineering Tools	2, 7	Tests, Project
6. Communication	3, 8	Tests, Project
7. Individual and Teamwork	-	-
8. Professionalism	-	-
9. Impact on Society and the Environment	2, 3, 4, 5, 6, 8	Tests, Project
10. Ethics and Equity	-	-
11. Economics & Project Management	-	-
12. Life-Long Learning	5, 6, 7, 8	-

4.5 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on CourseLink but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and project.

4.6 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

4.7 Relationships with other Courses & Labs

Previous Courses:

ENGG*2230 Fluid Mechanics: Analysis of fluid flow systems using the continuity, energy, and momentum equations. Introduces pipe and open channel flow.

ENGG*3650 Hydrology: Quantitative study of natural water circulation systems with an emphasis on watershed inputs and outputs and run-off generation.

Previous OR Follow-on Course:

ENGG*3100 Engineering and Design III: Integrates the knowledge gained in advanced engineering courses with design skills to solve open-ended engineering problems.

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures:

Tuesday	1:00 – 2:20 pm	RICH 2529	
Thursday	1:00 – 2:20 pm	RICH 2529	
Tutorial:			
Monday	8:30 – 10:20 am	THRN 2313	Section 2
Wednesday	8:30 – 10:20 am	THRN 2313	Section 1

5.2 Lecture and Tutorial Schedule (timing of course content subject to adjustment at the discretion of the instructor)

Week	**Lecture Content** ***Independent learning***	**Design Lab**	**Learning Objectives**
1 Sept. 8-14	Course Outline Hydraulics for Water Distribution Systems	Introduction to EPANet / Practice Tutorial	1, 2
2 Sept. 15-21	Design Considerations for WDS Water Network Analysis, Quality, Storage Facilities	EPANet Practice Tutorial / Practice Test	1, 2
3 Sept. 22-28	WDS if needed Hydrology Review/Urban Hydrology	**Test 1**	1, 2
4 Sept. 29-Oct. 5	**Test 1** Open Channel Hydraulics Review Gutter, Inlet, Storm Sewer Design Effects of Urbanization	Introduction to EPASWMM / EPA SWMM Runoff	1, 2
5 Oct. 6-17	Stormwater Management (SWM) Objectives / LID Approach Overview of SWM/LID Practices *Better Site Design, Pollution Prevention* Screening Level Design	EPA SWMM Conveyance / Term Project	3,4,5,7
6 Oct. 18-24	Design Criteria Pond Routing Example Ponds/Wetlands	Term Project	3,6,7
7 Oct. 25-31	Ponds/Wetlands Continued Lot-level Controls (infiltration) Lot-level Controls (bioretention)	EPA SWMM Detention	6,7
8 Nov. 1-7	Feedback on Proposals Develop Rubric for Report	Term Project	6,7, 8

	Bioswale Design Proprietary Devices (if time allows)		
9 Nov. 8-14	Partial Pipe Hydraulics WW Design Considerations	Term Project	1,6,7
10 Nov. 15-21	WW Design Considerations Sanitary Sewer Design Example	EPA SWMM Continuous / EPA SWMM LID	1, 2, 6, 7
Nov. 22-28	**Test 2**	Term Project	1, 2, 6, 7
Nov. 29-Dec. 2	Infrastructure Maintenance and Rehabilitation Laws and Regulations Integrated Urban Water Management	Term Project	5, 6, 7, 8
Final Models Due Sunday, December 4, 11:59 pm **Presentation of Design, Simulation and Evaluation To Be Scheduled December 5-9**			

5.3 Other Important Dates

Monday, October 10, 2016: Thanksgiving Day, No Classes

Tuesday, October 11, 2016: Study Day, No Classes

Friday, November 4, 2016: 40th Class Day - Last day to drop classes

Friday, December 2, 2016: Classes conclude

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

If the laboratory rules are not followed, consequences will include removing student's access to the lab. If this results in work not being completed, the student will receive a grade of 0.

7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:
http://www.academicintegrity.uoguelph.ca/

Please also review the section on Academic Misconduct in your Engineering Program Guide.

The School of Engineering has adopted a Code of Ethics that can be found at:
http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible

For more information, contact Student Accessibility Services at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

9 RECORDING OF MATERIALS

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:
http://www.uoguelph.ca/registrar/calendars/index.cfm?index