ENGG*4370 Urban Water Systems Design

Fall 2019
Section(s): C01

School of Engineering
Credit Weight: 0.75
Version 2.00 - September 10, 2019

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1 Course Details

1.1 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. Modeling of water systems for sustainable urban development.

Pre-Requisites: ENGG*2230, ENGG*3650

1.2 Course Description

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.

1.3 Timetable

Lectures

Tuesdays	8:30 - 9:50	THRN 1307
Thursdays	8:30 - 9:50	THRN 1307

Labs

Fridays	14:30 - 16:20	THRN 2313
Tuesday	11:30 - 13:20	THRN 2313

1.4 Final Exam

There is no final exam.

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2 Instructional Support

2.1 Instructional Support Team

Instructor: Andrea Bradford
Email: abradfor@uoguelph.ca
Telephone: +1-519-824-4120 x52485
Office: THRN 1342
Office Hours: Please arrange an appointment by email

2.2 Teaching Assistants

Teaching Assistant: Stephen Stajkowski
Email: stajkows@uoguelph.ca
Office Hours: Tutorials only.

Teaching Assistant: Brett Snider
Email: bsnide01@uoguelph.ca
Office Hours: Tutorials only.

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3 Learning Resources

3.1 Required Resources

Course Website (Website)

http://courselink.uoguelph.ca

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.

3.2 Recommended Resources

Chin, D.A., 2013. Water-Resources Engineering. 3rd Edition. Prentice Hall. 962 pp (Textbook)

3.3 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 <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

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4 Learning Outcomes

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.

4.1 Course Learning Outcomes

By the end of this course, you should be able 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.

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
1	Knowledge Base	1, 2, 3, 4, 5
1.4	Recall, describe and apply program-specific engineering principles and	1, 2, 3, 4, 5

#	Outcome	Learning Outcome
	concepts	
2	Problem Analysis	1
2.2	Identify, organize and justify appropriate information, including assumptions	1
2.3	Construct a conceptual framework and select an appropriate solution approach	1
2.4	Execute an engineering solution	1
4	Design	2, 3, 4, 5, 6, 7
4.2	Construct design-specific problem statements including the definition of criteria and constraints	3
4.3	Create a variety of engineering design solutions	5, 6
4.4	Evaluate alternative design solutions based on problem definition	2, 4, 6, 7
4.5	Develop and refine an engineering design solution, through techniques such as iteration, simulation and/or prototyping	6, 7
5	Use of Engineering Tools	2, 7
5.2	Demonstrate proficiency in the application of selected engineering tools	2, 7
5.3	Recognize limitations of selected engineering tools	2, 7
7	Communication Skills	8
7.3	Construct the finished elements using accepted norms in English, graphical standards, and engineering conventions, as appropriate for the message and audience	8
7.4	Substantiate claims by building evidence-based arguments and integrating effective figures, tables, equations, and/or references	8
9	Impact of Engineering on Society and the Environment	3, 7
9.1	Analyze the safety, social, environmental, and legal aspects of engineering activity	3, 7
9.2	Evaluate the uncertainties and risks associated with engineering activities	3, 7
9.3	Anticipate the positive and negative impacts of introducing innovative technologies to solve engineering problems	7

5 Teaching and Learning Activities

Timing of course content subject to adjustment at the discretion of the instructor. Italicized topics are independent study.

5.1 Lecture

Week 1 (Sept. 5-11)

Topics:	Course Outline, Hydraulics for Water Distribution Systems (WDS)

Week 2 (Sept. 12-18)

Topics:	Design Considerations for WDS, Hydraulics for WDS II

Week 3 (Sept. 19 -25)

Topics:	Water Network Analysis, Quality, Storage Facilities; Hydrology Review / Urban Hydrology, Effects of Urbanization

Week 4 (Sept. 26 - Oct. 2)

Topics:	Stormwater Management (SWM) Objectives / LID Approach, Overview of SWM/LID Practices, Better Site Design, Pollution Prevention, Screening Level Design

Week 5 (Oct. 3-9)

Topics:	**Test 1 (Part 2)**; Open Channel Hydraulics Review, Gutter, Inlet, Stormsewer Design

Week 6 (Oct. 10-17)

Topics:	Design Criteria, Pond Routing Example, Pond and Wetland Design

Week 7 (Oct. 18-24)

Topics:	Pond and Wetland Design Continued, Infiltration and Bioretention Design

Week 8 (Oct. 25 - 31)

Topics:	**Test 2 (Take Home),** Bioswale Design, Proprietary Devices (time permitting)

Week 9 (Nov. 1 - 7)

Topics:	Partial Pipe Hydraulics, Wastewater Design Considerations

Week 10 (Nov. 8 - 14)

Topics:	Sanitary Sewer Design Example

Week 11 (Nov. 15 - 21)

Topics:	**Test 3: Sanitary Sewer Design**

Week 12 (Nov. 22 - 28)

Topics:	Infrastructure Maintenance and Rehabilitation, Laws and Regulations, Integrated Urban Water Management

5.2 Lab

Week 1

Topics:	Introduction to EPANet

Week 2

Topics:	EPANet Tutorial

Week 3

Topics:	EPANet Tutorial / Practice Test

Week 4

Topics:	**Test 1: Water Distribution Systems**

Week 5

Topics: EPASWMM Runoff and Conveyance

Week 6

Topics: No Labs

Week 7

Topics: Term Project / EPA SWMM Detention

Week 8

Topics: Term Project

Week 9

Topics: Term Project / **Modelling and Pond Design Check**

Week 10

Topics: EPASWMM Continuous / EPA SWMM LID

Week 11

Topics: Term Project

Week 12

Topics: Term Project / **Modelling and LID Design Check**

5.3 Other Important Dates

Monday, October 14, 2019: Thanksgiving Day, No Classes

Tuesday, October 15, 2019: Study Day, No Classes

Thursday, November 28, 2019: Make up for Study Day (Tuesday Schedule - lecture only)

6 Assessments

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

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Test 1	20
Test 2	10
Test 3	20
Project	50
Total	100

6.2 Assessment Details

Test 1 (20%)
Date: Week 4
Learning Outcome: 1, 2
Friday, September 27, 2:30 - 4:20 pm, THRN 2313 (for 0102, Friday Labs) **OR** Tuesday, October 1, 11:30 - 1:20 pm, THRN 2313 (for 0101, Tuesday Labs) **AND** Thursday, October 3, 8:30 - 9:50 am, THRN 1307

Test 2 (10%)
Date: Week 8
Learning Outcome: 3, 4, 5
Will be given as a "take home" exam. Available Friday, Oct. 25. To be submitted by Monday, Oct. 28, 4:00 pm.

Test 3 (20%)
Date: Week 11
Learning Outcome: 1, 2
Tuesday, Nov. 19 **AND** Thursday, Nov. 21, 8:30 - 9:50 am, THRN 1307

Project: Modelling and Extended Detention Pond Design Check (10%)
Date: Week 9
Learning Outcome: 6, 7
Friday, November 1 2:30 - 4:20 OR Tuesday, November 5 11:30 - 1:20 (Required results due at least 24h before beginning of Lab)

Students who are late or do not attend the lab for the modelling and design check will receive 0% on the assessment.

Project: Modelling and LID Design Check (10%)
Date: Week 12
Learning Outcome: 6, 7
Friday, November, 22 2:30 - 4:20 OR Tuesday, November 26 11:30 - 1:20 (Required results due at least 24h before beginning of lab)

Students who are late or do not attend the lab for the modelling and design check will receive 0% on the assessment.

Project: Final Paper on Stormwater Management System Design and Analysis (30%)
Date: Sun, Dec 8, 11:59 PM
Learning Outcome: 5, 6, 7, 8

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7 Course Statements

7.1 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.

Modelling and design checks: Students who are late or do not attend the lab for the modelling and design check will receive 0% on the assessment.

Late Penalty for Final Paper: 10% deduction for <1h late; 25% deduction for <12h late; 50% deduction for <24 late. Submissions that are more than 24 h late will not be accepted.

8 School of Engineering Statements

8.1 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. Some written lecture notes will be presented only in class. 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 labs.

8.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. 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.

8.3 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.

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

9.6 Academic Integrity

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 encourages academic integrity. 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 or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

9.7 Recording of Materials

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

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars
