



# ENGG\*4370 Urban Water Systems Design

Fall 2018

Section(s): C01

School of Engineering

Credit Weight: 0.75

Version 2.00 - November 01, 2018

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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-Requisite(s):** ENGG\*2230, ENGG\*3650

### 1.2 Timetable

**Lectures:**

Tuesday	8:30 – 9:50 am	RICH 2529
Thursday	8:30 – 9:50 am	RICH 2529

**Tutorial:**

Friday	3:30 – 5:20 pm	THRN 2313	Section 1
Wednesday	3:30 – 5:20 pm	THRN 2313	Section 2

### 1.3 Final Exam

There is no final exam.

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## 2 Instructional Support

### 2.1 Instructor(s)

**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 Assistant(s)

**Teaching Assistant:** Stephen Stajkowski  
**Email:** stjawks@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 Resource(s)

**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 Resource(s)

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.
9. Critique a stormwater management design and provide constructive feedback on a design report.
10. Use feedback to reflect on and self-assess competencies in urban water systems design, and create a plan for continued development.

### 4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome Set Name	Course Learning Outcome
1	Knowledge Base	1, 2, 3, 4, 5, 9
1.4	Recall, describe and apply program-specific engineering principles and concepts	1, 2, 3, 4, 5, 9
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

#	Outcome Set Name	Course Learning Outcome
4	Design	2, 3, 4, 5, 6, 7, 9
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, 9
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, 9, 10
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
7.5	Demonstrate ability to process oral and written communication by following instructions, actively listening, incorporating feedback, and formulating meaningful questions	9, 10
8	Professionalism	9
8.3	Demonstrate professional behaviour	9
9	Impact of Engineering on Society and the Environment	3, 7, 9
9.1	Analyze the safety, social, environmental, and legal aspects of engineering activity	3, 7, 9
9.2	Evaluate the uncertainties and risks associated with engineering activities	3, 7, 9
9.3	Anticipate the positive and negative impacts of introducing innovative technologies to solve engineering problems	7, 9
12	Life Long Learning	10
12.2	Self-assess skills relative to career goals and SOE defined learning outcomes	10
12.3	Demonstrate capability for continuous knowledge and skill development in	10

#	Outcome Set Name	Course Learning Outcome
	a changing world	

## 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. 6-12)

**Topic(s):** Course Outline, Hydraulics for Water Distribution Systems (WDS)

#### Week 2 (Sept. 13-19)

**Topic(s):** Design Considerations for WDS, Hydraulics for WDS II

#### Week 3 (Sept. 20-26)

**Topic(s):** Water Network Analysis, Quality, Storage Facilities; Hydrology Review / Urban Hydrology, Effects of Urbanization

#### Week 4 (Sept. 27 - Oct. 3)

**Topic(s):** Stormwater Management (SWM) Objectives / LID Approach, Overview of SWM/LID Practices, Screening Level Design

#### Week 5 (Oct. 4-11)

**Topic(s):** **Test 1 (Part 2);** SWM Overview Continued, *Better Site Design, Pollution Prevention*, Open Channel Hydraulics Review, Gutter, Inlet, Stormsewer Design

#### Week 6 (Oct. 12-18)

**Topic(s):** Design Criteria, Pond Routing Example, Pond and Wetland Design

#### Week 7 (Oct. 19-25)

**Topic(s):** Pond and Wetland Design Continued, Infiltration and Bioretention Design

**Week 8 (Oct. 26 - Nov. 1)**

**Topic(s):** Bioswale Design, Proprietary Devices (time permitting), Partial Pipe Hydraulics

**Week 9 (Nov. 2 - 8)**

**Topic(s):** Feedback on Preliminary Reports, Wastewater Design Considerations

**Week 10 (Nov. 9 - 15)**

**Topic(s):** Sanitary Sewer Design Example, Peer Evaluation Training/Quiz

**Week 11 (Nov. 16 - 22)**

**Topic(s):** **Test 2: Sanitary Sewer Design**

**Week 12 (Nov. 23 - 29)**

**Topic(s):** Infrastructure Maintenance and Rehabilitation, Laws and Regulations, Integrated Urban Water Management

## **5.2 Lab**

**Week 1**

**Topic(s):** Introduction to EPANet, Pre-term survey

**Week 2**

**Topic(s):** EPANet Tutorial

**Week 3**

**Topic(s):** EPANet Tutorial / Practice Test

**Week 4**

**Topic(s):** **Test 1: Water Distribution Systems**

**Week 5**

**Topic(s):** Introduction to EPASWMM / EPASWMM Runoff

**Week 6**

**Topic(s):** EPASWMM Conveyance / Term Project

**Week 7**

**Topic(s):** Term Project

**Week 8**

**Topic(s):** EPASWMM Detention

**Week 9**

**Topic(s):** Term Project

**Week 10**

**Topic(s):** EPASWMM Continuous / EPA SWMM LID

**Week 11**

**Topic(s):** Term Project

**Week 12**

**Topic(s):** Term Project

### **5.3 Other Important Dates**

**Monday, October 8, 2018:** Thanksgiving Day, No Classes

**Tuesday, October 9, 2018:** Study Day, No Classes

**Friday, November 2, 2018:** 40<sup>th</sup> Class Day - Last day to drop classes

**Thursday, November 29, 2018:** Make up for Study Day (Tuesday Schedule)

**Friday, November 30, 2018:** Make up for Thanksgiving Day (Monday Schedule)

**Week of December 3 - 7:** Presentations of Design, Simulation and Evaluations **To Be Scheduled**

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# 6 Assessments

## 6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Test 1	20
Test 2	20
Project	60
Total	100

## 6.2 Assessment Details

### Test 1 (20%)

Friday, September 28, 3:30 - 5:20 pm, THRN 2313 (for Section 1, Friday Labs) **OR** Wednesday, October 3, 3:30 - 5:20 pm, THRN 2313 (for Section 2, Wednesday Labs) **AND** Thursday, October 4, 8:30 - 9:50 am, RICH 2529

### Test 2 (20%)

Tuesday, Nov. 20 **AND** Thursday, Nov. 22, 8:30 - 9:50 am, RICH 2529

### Preliminary Project Report (5%)

Document and Model Files due Thurs., Oct. 25, 11:59 pm

### Preliminary Report Reviews (2%)

Required to receive report grade. Mon., Oct. 29, 11:59 pm

### Report on Traditional Design and Simulation (20%)

Report and Model Files due Mon., Nov. 12, 11:59 pm

### Quiz on Evaluation Rubric and Expectations (3%)

Required to receive report review grade. Tues., Nov. 13, 8:30 - 9:50 am

### Design Report Reviews (5%)

Required to receive design report grade. Sat., Nov. 24, 11:59 pm

### LID Design, Simulation and Evaluation (20%)

Model files due Sat. Dec. 1, 11:59 pm, Presentations to be Scheduled Dec. 3-7

### Reflection and Response to Feedback (5%)

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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.

**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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## 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.

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## 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 regulations and procedures for [Academic Consideration](#) are detailed in the Undergraduate Calendar.

## 9.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

## 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.

More information: [www.uoguelph.ca/sas](http://www.uoguelph.ca/sas)

## 9.6 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 or faculty advisor.

The [Academic Misconduct Policy](#) is detailed in the Undergraduate Calendar.

## 9.7 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, a classmate 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 which apply to undergraduate, graduate and diploma programs.

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