



## **STORMWATER MANAGEMENT AND LOW IMPACT DEVELOPMENT**

Course Syllabus for ENVE 5705 – Fall 2022

### **INSTRUCTOR**

Prof. Jennifer Drake

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Office hours: Wednesday, 3:00 – 4:00pm on Zoom

### **CLASS TIME**

Wednesdays, 6:05 pm – 8:55 pm

### **COURSE WEBSITE**

We will use Brightspace for the course. The syllabus, assignments, reading materials, and announcements will be posted to Brightspace. We will use TEAMS for class discussions and Q&A's. This can be accessed through Brightspace.

### **COURSE BACKGROUND AND OBJECTIVES**

The low impact development (LID) design approach will be examined as a tool for sustainable urban planning and stormwater management. Course will cover conventional (stormwater management ponds), vegetated (green roofs, bioretention), infiltration (permeable pavements, exfiltration cells) and treatment (oil-grit separators, filter strips) stormwater systems, modelling approaches and erosion control and operational considerations

### **TOPICS COVERED**

End-of-pipe controls, source controls, stormwater quality and quantity, operation and maintenance, living infrastructure, SWMM, design and construction

### **LEARNING OBJECTIVES**

One of the most common complaints that I hear from colleagues in the private and public sectors is that it is extremely difficult to find trained and skilled professionals who can design low-impact development technologies or green infrastructure. I created this course to address this need. When you have completed this course, you will:

- (1) Become familiar with relevant guidelines and regulations related to stormwater management systems.
- (2) Be able to size and model low impact development and end-of-pipe systems to achieve stormwater quantity and quality design objectives.
- (3) Understand the potential applications and limitation of different stormwater technologies in the context of climate change mitigation and adaptation, population growth, and equity.
- (4) Develop and advance your professional and communication skills to support your future career in academia and the engineering work world.

### PRE-REQUISITES

Course material requires background knowledge of hydrology and hydraulics. Required prerequisites are ENVE 3003 Water Resources Engineering and CIVE4307 Municipal Hydraulics. Material that is assumed knowledge includes:

- Hydraulic structures (Weirs and Orifices)
- The Rational Method
- Curve Numbers
- Water Balances
- Intensity-duration-frequency (IDF) curves

### OFFICE HOURS

I have an open-door policy. I encourage you to make of this flexible policy to drop by to chat about anything that is related to the course or to discuss how I could better support your learning. Please visit my office anytime or message me on teams during regular weekday office hours (9 AM – 4 PM). I will be available virtually for office hours on Wednesdays from 3 – 4 PM.

### EVALUATION

Final grades will be determined in the following manner:

Assignments (4 assignments): 40%

Group Project: 25%

Final Exam: 35%

### GRADING

Letter grades will follow the University percentage rubric:

A+: 90-100%	A: 85-89%	A-: 80-84%
B+: 77-79%	B: 73-76%	B-: 70-72%
C+: 67-69%	C: 63-66%	C-: 60-62%
D+: 57-59%	D: 53-56%	D-: 50-52%
F: 0-49%		

## WEEKLY SCHEDULE AND ASSIGNMENTS

(Subject to change)

Week		Class topic	In class Activities
1	Sep 14	<b>Course Overview</b> Stormwater Management & LID	-Introductions
2	Sep 21	<b>Design of Green roofs</b>	-Discuss/review project background documents
3	Sep 28	<b>Design of Green roofs</b>	-Guest lecturers (Virtual Class) -Mini lectures (3)
4	Oct 5	<b>Design of Bioretention systems</b> <u>Assignment</u> -Visit and inspect local Bioretention systems	-Mini lectures (5) -Treatment train Brainstorming
5	Oct 12	<b>Modelling LID</b>	-Mini Lectures (5) -Project peer-to-peer feedback (LID selection and layout)
6	Oct 19	<b>Stormwater and LID in Ottawa</b>	-Guest Lecture – City of Ottawa (Virtual Class) -Mini Lectures (5)
-	Oct 26	<b>No class</b> (Fall break)	
7	Nov 2	<b>Design of Permeable Pavements</b> <u>Assignment</u> -Permeable Pavement Design	-Mini Lectures (5) -Project Check-In, Q&A
8	Nov 9	<b>Design of Permeable Pavements</b>	-Mini Lectures (5)
9	Nov 16	<b>End-of-Pipe systems as reservoirs</b> <u>Assignment</u> -Verify SWM pond design	-Mini Lectures (5) Project peer-to-peer feedback (sizing)
10	Nov 23	<b>Design of SWM Ponds</b>	-Mini Lectures (5) -Project presentation planning
11	Nov 30	<b>Design of SWM Ponds</b>	-Mini Lectures (5)
12	Dec 7	<b>Open Topic</b>	Mini Lectures (5) -Project Awards -Best all around -Most creative/unusual -...

## LATE ASSIGNMENTS

I follow a flexible policy for assignment submissions. Each student will receive **four 12-hour grace tokens**. They can be used in combination or individually and will be applied automatically by the teaching team. For example, you can use all four tokens to extend one assignment by 2-days or use the tokens individually to extend assignment submission time by 12 hours each. Grace tokens cannot be applied to the term project.

**You do not need to ask to use a grace token. They will be applied automatically by the teaching team.**

All assignments should be prepared for submission as if you are in a professional environment. Appropriate writing should be used to introduce the problems you are assessing and discuss/describe results, regardless of whether the assignment asks for a write-up. Your name and the name of the assignment should appear at the top of your assignments. Points will be deducted for poor grammar and spelling.

Standing in a course is determined by the course instructor, subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

## COURSE COPYRIGHT

Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copyright protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s).

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

## COURSE MODALITY

**Attendance is NOT MANDATORY**, but this course is intended to be completed in person and will regularly include break-out group work and student-led presentations.

### Session Recording

Lectures will be recorded and made available on Brightspace. The purpose of these recordings is to ensure students do not feel pressure to attend class if they are unwell and to support student learning.

Please note that recordings are protected by copyright. The recordings are for your own educational use, but you are not permitted to publish to third-party sites, such as social media sites and course materials sites.

## **Absences Due to Illness**

As we all continue to navigate ongoing disruptions caused by COVID-19 pandemic, I request that you do not attend class if you have any symptoms, regardless of whether you believe it is covid or not. This protects you, your classmates and the wider university community. To support this, we are continuing the self-declaration process for the fall term. In place of a doctor's note or medical certificate, students will be advised to complete the self-declaration form (<https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf>) available on the Registrar's Office website to request academic accommodation for missed course work including exams and assignments. Students will also be encouraged to connect directly with their instructors to discuss required accommodations arising from the COVID-19 situation.

## **TERMS OF ENGAGEMENT**

Carleton University is committed to providing a living and learning environment that promotes student success inside and outside of the classroom. The Office of Student Affairs would like to remind all students that Carleton's conduct policies and students' rights and responsibilities also apply to online communication. We are committed to ensuring a respectful and engaging online community.

### **Appropriate Online Behaviour in Discussion Forums**

Online discussion groups are most commonly used to develop critical thinking skills, foster innovation, and facilitate learning. To realize those benefits, everyone in the group must feel respected and safe.

- Think before you post: Would you say this to someone if you were having this conversation face to face? How would you react if someone else posted this comment? Commenting online can give a false sense of security. If you wouldn't say it in person, it's best to reword, and rethink your comment.
- Check your tone of voice: Read your comment out loud and be mindful of how it may sound to others who are reading it. If possible, get someone else to read it before you post it to ensure it comes across how you mean it to.
- Stay on topic: Stick to the discussion topic and avoid going off on tangents.
- Be mindful that others may have a difference of opinion: If you disagree with something that was posted, remember to be respectful in your reply. Think in terms of "my opinion vs. the issue," and not "me vs them;" in other words, focus on the idea(s), not the person communicating the idea.

### **Live-Stream Lecture Etiquette**

- Make sure you are in a quiet space for the live class, so that you and others can listen without being distracted by background noises.
- Mute your microphone when you aren't speaking to the class, so that others aren't distracted by outside noises.

- If comfortable, consider turning on your webcam for face-to-face interactions: so much of communication is seeing and responding to people's faces.
- Ensure that you don't have any posters, drawings, or writing in the background of your screen that could be offensive to others.
- If you are using a platform where you are asked to create a username, it is good practice to use your preferred name or the name you would use in a professional setting. Do not create a username that might be considered offensive.
- For synchronous sessions, follow whatever 'terms of engagement' your instructor sets: some instructors will want you to use the chat feature to indicate that you want to get involved; others will use the hand raising feature, or ask you to raise your hand with your webcam on. Whatever process your instructor uses, follow it. It can be disruptive and confusing for a moderator to have a participant free-for-all on this issue.
- Lastly, behave as you would if you were taking the class on campus.

## **ACADEMIC INTEGRITY**

The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, art works, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, material on the internet and/or conversations.

Examples of plagiarism include, but are not limited to: any submission prepared in whole or in part, by someone else; using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgment in any academic assignment; using another's data or research findings without appropriate acknowledgement; submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and failing to acknowledge sources through the use of proper citations when using another's work and/or failing to use quotations marks.

Plagiarism is a serious offence that cannot be resolved directly by the course's instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course or even suspension or expulsion from the University.

## **ACADEMIC ACCOMODATION**

Carleton University is committed to providing access to the educational experience in

order to promote academic accessibility for all individuals. Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University.

### **Addressing Human Rights Concerns**

The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at [equity@carleton.ca](mailto:equity@carleton.ca).

"The [Paul Menton Centre for Students with Disabilities \(PMC\)](#) provides academic accommodations and support services to students with Learning Disabilities (LD), mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision.

If you have a permanent, persistent/prolonged, or temporary disability requiring academic accommodations in my course, please contact the PMC at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation.

If you are already registered with the PMC, please request your accommodations for this course through the [Ventus Student Portal](#) at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). Requests made within two weeks will be reviewed on a case-by-case basis. For final exams, the deadlines to request accommodations are published in the [University's Academic Calendars](#).

After requesting accommodations through the Ventus Student Portal, please meet with me to discuss your accommodation needs and how they will be implemented in my course."