

# 2026–2027 / Fall 2026

## Water Resources Engineering

|                           |                                                   |
|---------------------------|---------------------------------------------------|
| Academic year & term      | 2026–2027 / Fall 2026                             |
| Course title              | Water Resources Engineering                       |
| Department/School         | Department of Civil and Environmental Engineering |
| Course number and section | ENVE 3003 / GEOG 4103                             |

### Teaching Team

|                         |                                                    |
|-------------------------|----------------------------------------------------|
| Instructor              | Wameed Alghazali                                   |
| Email                   | WameedAlghazali@cunet.carleton.ca                  |
| Office location & phone | CB 6212                                            |
| Office hours            | Please email the instructor to book a meeting time |
| TA(s)                   | Information will be posted on Brightspace          |

### Course Description and requirements

#### 1) Course schedule

Please refer to the Public Class Schedule for the most recent information.

#### 2) Course description

A quantitative analysis of natural water systems and the development of these systems as a resource. Components of the hydrologic cycle. Quantitative analysis of stream flow. Probability concepts in water resources. Reservoir design and operation. Hydraulic properties and availability of groundwater. Storm water management.

#### 3) Precluded courses

None.

#### 4) Prerequisites and recommended knowledge

ENVE 2300 or MAAE 2300.

#### 5) Learning Outcomes

Water resources engineering involves the analysis and design of systems to control the quality, quantity and distribution in time and space of water resources to meet societal needs while protecting human life and the environment. By the end of the course, successful students will have achieved the following learning outcomes:

1. Awareness of Federal and Provincial legislation related to water resources
2. Understand concepts of probability and risk, return periods, extreme events
3. Evaluate a water budget and estimate precipitation, storage, infiltration, evapotranspiration and runoff
4. Evaluate runoff flows and hydrographs
5. Develop design storms and hydrographs
6. Design flow control structures to reduce peak flows
7. Design stormwater management systems
8. Assess groundwater resources
9. Understand the optimization of reservoirs to meet needs and limit floods

#### 6) Graduate Attributes

The Canadian Engineering Accreditation Board (CEAB) requires graduates of undergraduate engineering programs to possess 12 attributes. Courses in all four years of our programs evaluate students' progress towards acquiring these attributes. Aggregate data (typically, the data collected in all sections of a course during an academic year) is used for accreditation purposes and to guide improvements to our programs. Some of the assessments used to measure GAs may also contribute to final grades; however, the GA measurements for individual students are not used to determine the student's year-to-year progression through the program or eligibility to graduate. The following

list provides the GAs that will be measured in this course, along with the Learning Outcomes that are intended to develop abilities related to these attributes.

| Graduate Attribute                                                           | Assessment Tool                                                             |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| GA 1.11.C Discipline-specific concept; Water Resources/Contaminant Hydrology | Multiple choice and short answer questions on the midterm and/or final exam |
| GA 5.1 Engineering Tools; Diagrams and engineering sketches                  | Midterm exam or assignment question on drawing a flow chart                 |
| GA 5.2 Engineering Tools; Document-processing and graphics packages          | Assignment on stochastic river flows                                        |

For information on GAs and continual curriculum improvement, visit the Accreditation section of the Engineers Canada website.

## 7) Accreditation Units

| Math | Natural Science | Complementary Studies | Engineering Science | Engineering Design |
|------|-----------------|-----------------------|---------------------|--------------------|
| 0.0  | 0.0             | 0.0                   | 50.0                | 50.0               |

## 8) Textbook(s)/Learning Materials and their costs

- Students are not required to purchase textbooks for this course.
- The following textbook is a good reference: Water Resources Engineering by David Chin, 4<sup>th</sup> Edition, 2020 (\$199.95, at the Bookstore). Water Resources Engineering (2nd edition) is available on reserve at the library.

## 9) Topics and tentative plan

(Subject to change)

| Week #  | Date    | Topics                                  | Activities                 | Notes                       |
|---------|---------|-----------------------------------------|----------------------------|-----------------------------|
| Week 1  | Sep. 09 | Welcome and Introduction                |                            |                             |
| Week 2  | Sep. 14 |                                         |                            |                             |
|         | Sep. 16 | Probability Concepts in Water Resources | 1 <sup>st</sup> PA Session | 1 <sup>st</sup> PA: Sep. 18 |
| Week 3  | Sep. 21 | Precipitation/Rainfall                  | Assignment #1 Released     | Due: Oct. 05                |
|         | Sep. 23 |                                         |                            |                             |
| Week 4  | Sep. 28 | Rainfall Abstractions                   |                            |                             |
|         | Sep. 30 |                                         |                            |                             |
| Week 5  | Oct. 05 |                                         | Assignment #2 Released     | Due: Oct. 19                |
|         | Oct. 07 |                                         |                            |                             |
| Week 6  | Oct. 12 | <b>Statutory holiday</b>                |                            |                             |
|         | Oct. 14 | Hydrologic Time Series Analysis         |                            |                             |
| Week 7  | Oct. 19 |                                         | Assignment #3 Released     | Due: Nov. 04                |
|         | Oct. 21 |                                         |                            |                             |
| Week 8  | Oct. 26 | <b>Fall break</b>                       |                            |                             |
|         | Oct. 28 |                                         |                            |                             |
| Week 9  | Nov. 02 | <b>Midterm exam</b>                     |                            |                             |
|         | Nov. 04 | Runoff Models                           |                            |                             |
| Week 10 | Nov. 09 |                                         |                            |                             |
|         | Nov. 11 |                                         | Assignment #4 Released     | Due: Nov. 24                |
| Week 11 | Nov. 16 | Routing Models                          |                            |                             |
|         | Nov. 18 |                                         |                            |                             |
| Week 12 | Nov. 23 | Stormwater Management                   |                            |                             |
|         | Nov. 25 |                                         |                            |                             |
| Week 13 | Nov. 30 | Groundwater Resources                   |                            |                             |
|         | Dec. 02 |                                         |                            |                             |
|         | Dec. 07 |                                         |                            |                             |
| Week 14 | Dec. 09 | Water Resources Planning and Management |                            |                             |

Final examination will be set by Examination Services.

## 10) Evaluation and marking scheme

| Component         | Weight (%) | Individual work? | Notes |
|-------------------|------------|------------------|-------|
| Assignments (4)   | 20.0       | Yes              |       |
| Midterm Exam      | 30.0       | Yes              |       |
| Final Examination | 50.0       | Yes              |       |

### a) Final Examination

- Final exams are for evaluation purposes and will not be returned to students.
- Exam Conditions: Closed book
- Final Exam Weight: 50.0%

Students who are unable to write the final examination because of extenuating circumstances, as defined in the Academic Consideration Policy, may apply for accommodation by contacting the Registrar's office. Consult Section 4.3 of the University Calendar.

### b) Exam format and e-proctoring statement

The final examination will be written on campus and proctored.

### c) Additional requirements

Smart watches, smart glasses, mobile phones, and other communication-, recording-, or internet-capable electronic devices are not permitted during examinations unless specifically authorized as an approved accommodation.

### d) Term work late submission policy

Requests for extensions will be assessed by the instructor on a case-by-case basis. Any non-approved late submissions will be deducted 10% per day, until the solutions are posted at which point the grade will be zero.

### e) Deferred term work and self-declaration

Students who claim extenuating circumstances defined in the Academic Consideration Policy, as a reason for missed term work, are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor. This must occur no later than three (3) days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. Consult Section 4.4 of the University Calendar.

The same policy applies to missed midterm examinations/tests.

## 11) Academic dates

Students should be aware of the academic dates (e.g. last day for academic withdrawal) posted on the Registrar's office web site <https://carleton.ca/registrar/registration/dates/academic-dates/> or Calendar website.

## Academic Integrity and Plagiarism

Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: <https://carleton.ca/engineering-design/current-students/fed-academic-integrity>. Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or expulsion.

One of the main objectives of the Academic Integrity Policy is to ensure that the work you submit is your own. As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. 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 violations of the policy include, but are not limited to:

- any submission prepared in whole or in part by someone else;
- 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;
- failing to acknowledge sources of information through proper citations when using another's work and/or failing to use quotation marks.

### Unauthorized Dissemination

As per Carleton's Academic Integrity Policy, Unauthorized Dissemination is a violation of the standards of academic integrity to publish, disseminate, or otherwise make available to a third-party instructional material where the instructor has explicitly prohibited their dissemination.

The materials (including the course outline, slides, posted notes, videos, labs, projects, assignments, quizzes, exams, and solutions) created for this course are intended for personal use only. They may not be reproduced, redistributed, or disseminated in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise—without written permission from the author(s), both during and after the semester.

### Generative Artificial Intelligence (GenAI)

As our understanding of the uses of GenAI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of GenAI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.

### Safer Learning and Working Environment

Carleton 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), Ombuds Services - Carleton University or submit an anonymous human rights concern through the University's online human rights concern form.

### Academic Accommodations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website ([students.carleton.ca/course-outline](https://students.carleton.ca/course-outline)).

### Engineering Academic Advising

[The Engineering Academic Support Service](#) assists undergraduate engineering students with course selection, registration, and learning support from first-year through to graduation.

Academic Advisors Contact can be found here: <https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/>.

### Student Mental Health and Wellness

As a university student you may experience a range of mental health challenges that can significantly impact your academic success and overall well-being. Carleton's [Wellness Services Navigator](#) is designed to help students connect with mental health and wellness resources.

If you need to talk to someone from the department for more information and support with connecting to resources, you can contact the following faculty members, depending on your program, or contact the department.

- Department: [CEEUGChair@cunet.carleton.ca](mailto:CEEUGChair@cunet.carleton.ca)
- Prof. Shoeleh Shams — [shoelehshams@cunet.carleton.ca](mailto:shoelehshams@cunet.carleton.ca) — 4242 Mackenzie
- ACSE: Prof. Cara Lozinsky — [caralozinsky@cunet.carleton.ca](mailto:caralozinsky@cunet.carleton.ca) — 2374 Mackenzie
- CIVE: Prof. Christian Viau — [Christian.Viau@carleton.ca](mailto:Christian.Viau@carleton.ca) — 4535 Mackenzie
- ENVE: Prof. Cole Van De Ven — [cole.vandeven@carleton.ca](mailto:cole.vandeven@carleton.ca) — 6210 Canal Building

Additional on-campus and off-campus resources are available through Carleton's wellness and counselling services:

1. [Emergencies and Crisis](#)
2. **Carleton's Wellness Desk:** Located at [204A MacOdrum Library](#), is a space for students to learn about resources, connect with our Wellness Coordinator, and decompress during stressful times of the year. You can pop into the Wellness Desk any time during its hours of operation – no appointments necessary! <https://wellness.carleton.ca/mental-health/wellness-desk/>
3. **Carleton's Care and Support Team:** The role of a Care and Support Team is to support students with any questions or concerns they may have relating to their academics, well-being, finances or any other challenges they may be experiencing. <https://wellness.carleton.ca/mental-health/student-care-and-support-team/>
4. **Carleton's Health and Counselling Services:** To book an appointment visit the [CHR Connect App](#) or contact the main clinic by calling 613-520-6674 ext. 2. If urgent, let the Patient Care Coordinator know or go in person to the main clinic (2500 Carleton Technology and Training Centre Building) and indicate that they are in crisis and need to speak to someone right away. <https://wellness.carleton.ca/counselling/>
5. **Carleton's Single Session Counselling:** To book an appointment visit the CHR Connect App. <https://thconnect.telushealth.com/mobile-app-information/xz6lzGrv>
6. **Residence Counselling and Wellness Service:** Counselling services specifically for students in residence. To book an appointment call 613-520-2600 ext. 8061. <https://carleton.ca/health/residence-counselling/>
7. **Carleton's Therapy Dogs:** Carleton's therapy dogs are around campus with their owners (who are Carleton University staff and faculty) to comfort and provide support to help you thrive as a university student. <https://wellness.carleton.ca/mental-health/therapy-dogs/>
8. **Good2Talk (1-866-925-5454):** Good2Talk is a free, confidential helpline providing professional counselling and information and referrals for mental health, addictions and well-being to post-secondary students in Ontario, 24/7/36 <https://good2talk.ca/>
9. **The Walk-In Counselling Clinic (off-campus community resource):** The Walk-in Counselling Clinic has offices in various locations across Ottawa and the greater Champlain region that are open 7 days a week. Individuals will be assisted, with no appointment, on a first-come, first-serve basis during the Walk-in Counselling Clinic hours. The Walk-in Counselling Clinic **offers services in many languages** and is free and confidential. More information can be found at: <https://walkincounselling.com/>
10. **Distress Centre of Ottawa and Region:** Available 10am-11pm, 7 days/week, 365 days/year. **Distress Line:** 613-238-3311, **Crisis Line:** 613-722-6914 or 1-866-996-0991, **Text:** 343-306-5550. <https://www.dcottawa.on.ca/>
11. **Distress and Crisis Ontario,** Available for chat 2 pm – 2 am EST. <https://www.dcontario.org/>
12. **BounceBack Ontario (Toll-Free: 1-866-345-0224)** is a free skill-building program managed by the Canadian Mental Health Association (CMHA). It is designed to help adults and youth 15+ manage low mood, mild to moderate depression and anxiety, stress or worry. Delivered over the phone with a coach and through online videos, you will get access to tools that will support you on your path to mental wellness. <https://bouncebackontario.ca/>