Teaching Team

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Course Description and requirements

1) Course schedule
   Day/time/location*
   
   Lectures:  Tuesday 2:35-3:55 pm
              Thursday 2:35-3:55 pm

   Problem Analysis:  Wednesday 6:05-6:55 pm

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

2) Course description

ENVE 3003 [0.5 credit] Water Resources Engineering


Also listed as GEOG 4103.

Prerequisite(s): third-year status in Engineering.

Lectures three hours a week, problem analysis one hour a week.
3) 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:

- Awareness of Federal and Provincial legislation related to the protection of our water resources
- Understand concepts of probability and risk in the context of return periods, extreme event distributions and meaning of a 100-year storm.
- Evaluate a water budget and estimate precipitation, interception and depression storage, infiltration, evapotranspiration and runoff
- Evaluate runoff flows and hydrographs
- Develop design storms and hydrographs
- Design flow control structures to reduce peak flows
- Design stormwater management systems to address stormwater quality and quantity
- Assess groundwater resources
- Understand the optimization of reservoirs to meet critical water needs (i.e. drinking water) and for flood control

Water resources engineers can work in a variety of firms and organizations. They work for engineering consulting firms or the City to evaluate and design systems to limit the impacts of development on flows in a river to ensure that the development does not cause flooding or significantly impact the quantity and quality of water resources. Stormwater retention ponds in new developments are a visible example. Water resources engineers work for conservations authorities to protect surface and subsurface water resources used for drinking water and control storage levels and flows from reservoirs. Ottawa gets its drinking water from the Ottawa River while rural residents and small smaller communities rely on groundwater resources. The Rideau Valley Conservation Authority controls the flows through the Rideau River canal system. Water resources engineers can work for all levels of government and research institutions to develop policy to protect water resources and to understand the impacts of climate change on our water resources.
4) 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. This 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.

<table>
<thead>
<tr>
<th>GA - Indicator</th>
<th>Assessment Tool</th>
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<tbody>
<tr>
<td>GA 1.11.C Discipline-specific concept; Water Resources/Contaminant Hydrology</td>
<td>Multiple choice and short answer questions on midterm and/or final</td>
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<tr>
<td>GA 5.1 Engineering Tools; Diagrams and engineering sketches</td>
<td>Midterm or assignment question on drawing a flow chart</td>
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<tr>
<td>GA 5.2 Engineering Tools; Document-processing and graphics packages</td>
<td>Assignment on stochastic river flows</td>
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For information on GAs and continual curriculum improvement, visit the Accreditation section of Engineers Canada website.

5) Accreditation Units

<table>
<thead>
<tr>
<th>Math</th>
<th>Natural Science</th>
<th>Complementary Studies</th>
<th>Engineering Science</th>
<th>Engineering Design</th>
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6) Text book(s)/References

Suggested Text

*Water Resources Engineering*, David A. Chin, Prentice Hall, any edition is good (on reserve in library)

Reference Text


Lecture Notes

Provided in Brightspace
7) Topics and tentative plan

Topics covered:

Introduction, aspects of water resources engineering, global and regional water quantities, hydrologic cycle, water budget analysis, Canadian legislation

Probability Concepts in Water Resources, return periods, risk, reliability, probability distributions, analysis of hydrologic data, frequency analysis

Precipitation/Rainfall, generation and distribution, intensity and duration, IDF curves, design rainfall, snow, extreme rainfall events

Rainfall Abstractions, interception, depression storage, infiltration, Horton and Green-Ampt models, evapotranspiration

Hydrologic Time Series Analysis, stochastic time series, simple Markov models for river flows

Runoff Models, time of concentration, peak-runoff models, Rational Method, continuous-runoff models, hydrographs, unit hydrograph, time-area model

Routing Models, Modified Puls method, Muskingum method, hydraulic routing for reservoirs

Stormwater Management, stormwater quality, design flows, flood control, water-quality control, best management practices

Groundwater Resources, distribution and measurement, aquifer properties, well hydraulics, superposition, image wells

Water Resources Planning and Management, water supply, floodplain management, drought management, irrigation, dams and reservoirs

8) Evaluation and marking scheme

a) Final Examination
   i) Final exams are for evaluation purpose and will not be returned to students.
   ii) Closed Book with a formula sheet provided before exam
   iii) Final Exam Weight is 50% of final grade
   iv) Formally scheduled exam

   ii) Deferred Final Examinations: Students who are unable to write the final examination because of a serious illness/emergency or other circumstance beyond their control may apply for accommodation by contacting the Registrar’s office. Consult the Section 4.3 of the University Calendar.

b) Midterm Examination
   i) Closed Book with a formula sheet provided before exam
ii) Midterm Exam Weight is 30% of final grade

iii) Midterm will be held during class time

c) Assignments

i) Assignments Weight is 20% of final grade

d) Exams will be in-person and proctored. If another COVID type event occurs and exams move on-line, Carleton's e-proctoring system will be used and requires the use of webcams, microphones and smart phones.

e) Self-Declaration form and deferred term work

Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases. 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.

9) 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/

Academic Integrity and Plagiarism

a) 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.

b) 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; and
· failing to acknowledge sources of information through the use of proper citations when using another’s work and/or failing to use quotations marks.

Copyright

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Learning and Working Environment

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. We will strive to create an environment of mutual respect for all through equity, diversity, and inclusion within this course. The space which we work in will be safe for everyone. Please be considerate of everyone’s personal beliefs, choices, and opinions.

Academic Accommodations

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Academic Accommodations for Students with Disabilities**: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/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 disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca.

You should request your academic accommodations in the Ventus Student Portal, for each course at the beginning of every term. For in-term tests or midterms, please request accommodations at least two (2) weeks before the first test or midterm. Please consult the PMC.
website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

**Accommodation for Student Activities**: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the Senate Policy on Accommodation for Student Activities (PDF).

**Pregnancy Obligation**: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the Student Guide to Academic Accommodation (PDF).

**Religious Obligation**: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the Student Guide to Academic Accommodation (PDF).

**Survivors of Sexual Violence**: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton’s Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the Sexual Violence Prevention & Survivor Support.

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**Engineering Academic Advising**

The [Engineering Academic Support Service](https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/) 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/](https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/).

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**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](https://carleton.ca/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 at or [CEEUGChair@cunet.carleton.ca](mailto:CEEUGChair@cunet.carleton.ca).
Here is a list of on-campus and off-campus resources:

1. **Carleton’s Health and Counselling Services**: To book an appointment contact the main clinic by calling (613) 520-6674. 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. For more information, please see [https://carleton.ca/health/](https://carleton.ca/health/)

2. **Emergencies and Crisis** and **Emergency Numbers**

3. **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/](https://good2talk.ca/)

4. **Empower Me**: Undergraduate students have access to free counselling services in the community through Empower Me, either in person, by telephone, video-counselling or e-counselling. This free service is accessible 24/7, 365 days per year. Call 1-844-741-6389 (toll free) to make an appointment with a counsellor in the community. More information is available [https://students.carleton.ca/services/empower-me-counselling-services/](https://students.carleton.ca/services/empower-me-counselling-services/)

5. **The Walk-In Counselling Clinic (off-campus community resource)**: The walk-in Counselling Clinic have 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/](https://walkincounselling.com/)

6. **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/](https://www.dcottawa.on.ca/)


8. **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/](https://bouncebackontario.ca/)