

DEPT OF GEOGRAPHY & ENVIRONMENTAL STUDIES
CARLETON UNIVERSITY

DRAFT Course Outline
GEOG 3103A: Watershed Hydrology
September – December 2025

Instructor: Dr. Jennifer Totten

Office Hours: Wednesdays 11:30 am – 12:45 pm (Loeb A209); Mondays & Thursdays 7 – 9 pm (on Discord)

E-mail: jennifer.totten@carleton.ca

TA: Yasaman Amini (yasamanamini@cmail.carleton.ca)

Lectures: Wednesdays and Fridays, 1:05 pm – 2:35 pm; Location: TBA

Labs: Wednesdays: 15:35 - 17:25 hrs; Loeb A237

Link to BrightSpace Page: <https://brightspace.carleton.ca/d2l/home/370275>

Pre-Requisite: GEOG 2013A

Course Objectives/ Learning outcomes:

Hydrology is the study of the hydrologic cycle: the continuous movement of water from the atmosphere to the surface of the earth, on and into the surface, through the subsurface, and back to the atmosphere. During this course, students will develop a sound understanding of the various components of the hydrological cycle. Students will be able to identify these components, describe how they work, and identify how we measure them. Students will be able to discuss the importance of measuring and monitoring these components for water resource assessment. Students will be able to analyze various hydrological data sets to interpret specific hydrological regimes and extreme hydrological events. Students will discuss and understand the shifting nature of all components of the hydrological cycle in the face of the changing climate.

General areas of study:

1. Hydrological cycle & world water balance
2. Precipitation
3. Interception
4. Evaporation and Evapotranspiration
5. Infiltration
6. Soil moisture and groundwater hydrology
7. Surface runoff
8. Snow hydrology
9. Urban hydrology
10. Drylands hydrology
11. Wetlands hydrology
12. Extreme hydrological events: floods & droughts
13. Water quality and pollution

Reading material:

There is no textbook for this course. Readings for all the various topics will be provided on the *BrightSpace* course web site (<https://brightspace.carleton.ca/d2l/home/370275>). It is the responsibility of each student to familiarize themselves with this material. Material contained in the course readings will be included on the final exam. Additional material may be assigned during the term.

Course teaching and learning activities, including outlines, lectures, PowerPoint presentations, discussions, posted notes, labs etc., by both instructors and students, are copy protected and remain the intellectual property of their respective author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the 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 communication:

Communication for this course will be through a number of means. The lectures & labs will be held in-person, on campus. Course material will be available on *BrightSpace*. Additionally, there will be an online forum (hosted on *Discord*), there is access via email or you may consult me on campus or online. There are several forums set up on the GEOG 3103 Server on *Discord*: a general discussion forum for students to communicate with one another, one set up for asking the Instructor questions (so you don’t have to email, unless it’s personal), and one for asking the TA questions. There are both texting channels & voice channels, so there are many options for us to stay in touch. The instructions for accessing the *Discord* server are posted separately on the *Brightspace* course page, but the link is here below.

<https://discord.gg/UNXHDR5eQM>

I will be available for my **office hours** on **Wednesdays from 10:15-11:15 am on campus (Loeb A209)**, or **online on Discord** (on Office Hours voice channel) Monday & Thursday evenings from 7-9 pm. I may also answer questions at other times on the *Discord* server if I drop by the server. I will be checking the “Ask-the-Prof” forum frequently. There is also an Ask-the-TA Channel on *Discord* where the TA will answer questions periodically.

Course assessment:

The assessment for the course will be based on several components:

1. There will be 5 assignments on various aspects of the hydrological cycle. These will comprise 60% of the total grade.
2. Class participation grade is worth 15%. Grade is based on attendance, participation & submission of topical imagery/ideas as requested throughout the term.
3. A final in-person on paper closed-book 3-hour examination worth 25% of the total grade will be given, which will be made up of both long and short answer questions. This exam will cover the full term’s material. **You MUST pass the exam to pass the course.**

All elements of the course will be marked both for content (e.g. ideas, structure of arguments, research, citations etc.) and presentation (e.g. quality of writing, grammar, spelling, and graphical presentation). All assignments are to be submitted through *Brightspace*.

Exercise topics:

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| 1. Field Exercise – Infiltration measurement | 10% |
| 2. Field Exercise – Streamflow measurement | 10% |
| 3. Precipitation & streamflow data analysis | 15% |
| 4. Recurrence interval & base flow analysis | 15% |
| 5. Water journal | 10% |

Attendance and submission policy for course

All 5 Labs and all weekly tasks contribute to your grade. *Completion of all labs, weekly tasks and the final exam are required for successful completion of the course.* Submission dates are important. Lab reports are due via *Brightspace* by 11:59 pm on the date specified (see attached schedule). Assignments will only be accepted **for 2 days beyond the due date** with a penalty of 5% (of the lab itself) per day, *unless prior arrangements have been made*. The only exception is for reasons of illness or extenuating circumstances (see below).

Carleton University has a new procedure for Academic Consideration for Medical or other Extenuating Circumstances that temporarily hinder a student's capacity to fulfil in-class academic requirements. The details of the policy & procedures are listed in the .pdf available on the course page on BrightSpace or from the Registrar's office. Students need to complete the online Academic Consideration for Coursework Form to request academic accommodation for missed course work including exams and assignments. Here is the link to the form: <https://carleton.ca/registrar/academic-consideration-coursework-form/> As per the Policy, students are to speak with their instructor before submitting a request for Academic Consideration. Requests are not automatically approved. Approving and determining the accommodation remains at the discretion of the instructor. As such, you should connect with me directly to discuss requested accommodations arising from medical or other situations. Please send me an email or discuss this with me during my Office Hours.

Unless otherwise specified, group work is not acceptable. This includes all term work and the final exam. Sharing of answers on the final exam is **strictly forbidden**. Submitting work that has been previously used in this or other courses is not permitted **in this course**. **Use of Generative AI tools is not permitted in this course**. Assignments will be returned via *Brightspace*, and general feedback will be provided in the lab period following. If you have any questions about the grading, please discuss this with your TA, or with me via email or during Office Hours.

Standing in this 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.

Academic Integrity Policies

Instructional offences include among other activities cheating, contravening examination regulations, plagiarism, submitting similar work in 2 or more courses *without prior permission*, and disrupting classes. Conduct offenses apply in areas of discrimination and sexual harassment. Further information about University regulations which define and regulate these offences is found at: <https://carleton.ca/secretariat/policies/>.

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, artworks, 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, including the unauthorized use of generative AI tools (e.g., ChatGPT);

- 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.

Statement on Student Mental Health

As a University student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. If you need help, please speak to someone. There are numerous resources available both on- and off-campus to support you. Here is a list that may be helpful:

Emergency Resources (on and off campus): <https://carleton.ca/health/emergencies-and-crisis/emergency-numbers/>

Carleton Resources:

- Mental Health and Wellbeing: <https://carleton.ca/wellness/>
- Health & Counselling Services: <https://carleton.ca/health/>
- Paul Menton Centre: <https://carleton.ca/pmc/>
- Academic Advising Centre (AAC): <https://carleton.ca/academicadvising/>
- Centre for Student Academic Support (CSAS): <https://carleton.ca/csas/>
- Equity & Inclusivity Communities: <https://carleton.ca/equity/>

Off Campus Resources:

- Distress Centre of Ottawa and Region: (613) 238-3311 or TEXT: 343-306-5550, <https://www.dcottawa.on.ca/>
- Mental Health Crisis Service: (613) 722-6914, 1-866-996-0991, <http://www.crisisline.ca/>
- Empower Me: 1-844-741-6389, <https://students.carleton.ca/services/empower-me-counselling-services/>
- Good2Talk: 1-866-925-5454, <https://good2talk.ca/>
- The Walk-In Counselling Clinic: <https://walkincounselling.com>

Academic Accommodation

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 (<https://students.carleton.ca/course-outline>) Please review the information about accommodations promptly.

Academic Consideration for medical or other extenuating circumstances: Write to me as soon as possible after the need for accommodation is known to exist, normally no later than 24 hours after the submission deadline. If you are going to miss course obligations (labs or submission deadlines), you must complete **the Academic Consideration for Coursework Form** (<https://carleton.ca/registrar/academic-consideration-coursework-form/>) to

request academic accommodation for missed course work. Request are not automatically approved. Approving & determining the accommodation remains at the discretion of the instructor.

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 impairment 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 for a formal evaluation. If you are already registered with PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term. Please consult the PMC website for the deadline to request accommodations for the formally scheduled exam.

Other Important Student Support Locations on Campus:

Paul Menton Centre (500 Unicentre) for students needing accommodation

Centre for Student Academic Success (4th Floor, Library, 613-520-2600, ext.3822)

Schedule for this term: (Lecture Order and Required Readings):

Lesson 1	Introduction & the hydrological cycle	Arnell, N. (2002) Hydrology and Global Environmental Change. Chapters 1 & 2 – pg. 1 – 20
Lesson 2	Precipitation	Hendricks, M.R. (2010) Introduction to Physical Hydrology. Chapter 2 – pg. 14 – 32 Knutson, T.R. <i>et al</i> , <u>Tropical cyclones and climate change</u> . Nature Geoscience, 2010
Lesson 3	Interception	Davie, T. & Quinn, N.W. (2019) <i>Fundamentals of Hydrology</i> . <u>Chapter 4 Interception</u> Pg. 69 - 85
Lesson 4	Evaporation & evapotranspiration	Arnell, N. (2002) Hydrology and Global Environmental Change. <u>Chapter 3</u> – pg. 42 - 64
Lesson 5	Infiltration	Manning, J.C. (1997). <i>Applied Principles of Hydrology</i> . <u>Chapter 5 Infiltration and soil water</u> Pg. 75 - 104.
Lesson 6	Groundwater hydrology	Davie, T. & Quinn, N.W. (2019) <i>Fundamentals of Hydrology</i> . <u>Chapter 5 Groundwater</u> Pg. 86 - 106
Lesson 7	Surface hydrology	Dingman, S.L. (2002) <i>Physical Hydrology (2nd ed)</i> . <u>Chapter 9 Stream response to water-input events</u> – pg. 389 – 435
Lesson 8	Snow hydrology	Viessman, W. & Lewis, G. (1996). <i>Introduction to Hydrology</i> . <u>Chapter 14 Snow Hydrology</u> - pp. 265 – 271 & 284 - 288.
Lesson 9	Urban Hydrology	MacKenzie, F.B. (1987) <i>Urbanization and the Hydrological Regime</i> , in <i>Canadian Aquatic Resources</i> (Healey & Wallace, eds.) Dept. of Fisheries & Oceans. Pg. 277 – 292
Lesson 10	Drylands Hydrology	Vyverberg, K. (2010) A Review of Stream Processes and Forms in Dryland Watersheds. 36 pgs
Lesson 11	Wetland Hydrology	Mitsch W.J. & Gosselink, J.G. (2007) <i>Wetlands</i> , <u>Chapter 4 Hydrology of Wetlands</u> . Pg.67-113.
Lesson 12	Floods & Droughts	Newson, M. (1994) <i>Hydrology and the River Environment</i> , <u>Chapter 4 Runoff Extremes</u> Pg. 64 – 89
Lesson 13	Water Quality	Cech, T.V. (2010) Principles of Water Resources. <u>Chapter 5: Water Quality</u> . Pg. 137 – 184.
Lesson 14	The Ocean & Desalination	Voituriez, B. (2003) The Changing Ocean: its effects on climate & living resources.

		Webster, P & Curry, J. (1998) The Oceans and Weather. In <u>Scientific American</u> pgs 38-43
	Course review	

Lab Assignment Schedule for Fall 2025 Term. <i>Assignment due dates are fixed.</i>	
Sept 10: Assignment 1 given & explained, due September 23 rd . ** Field Assignment **	
Sept 17: Lab working period, T.A. will help during your lab period.	
Assignment 1 DUE @ 11:59 pm Sept 23rd.	
Sept 24: Assignment 2 given & explained, due Oct 7. ** Field Assignment **	
Oct 1: Lab working period, T.A. will help during your lab period	
Assignment 2 DUE @ 11:59 pm Oct 7th.	
Oct 8: Assignment 3 given & explained, due Oct 28.	
Oct 15: Lab working period, T.A. will help during your lab period	
Oct 21- 25: Reading Week, no classes or lab sessions	
Assignment 3 DUE @ 11:59 pm Oct 28th.	
Oct 29: Assignment 4 given & explained, due Nov 11.	
Nov 5: Lab working period, T.A. will help during your lab period	
Assignment 4 DUE @ 11:59 pm Nov 11th.	
Nov 12: Assignment 5 given & explained, due Nov 28.	
Nov 19 Lab working period, T.A. will help during your lab period	
Assignment 5 DUE @ 11:59 pm <u>Nov 28th</u>.	
Nov 26: no more lab sessions.	