Fundamentals of Hydrology Syllabus

Department of Earth and Environmental Sciences

ERTH/ENVS 3701.03 Fall 2025

Dalhousie University operates in the unceded territories of the Mi'kmaw, Wolastoqey, and Peskotomuhkati Peoples. These sovereign nations hold inherent rights as the original peoples of these lands, and we each carry collective obligations under the Peace and Friendship Treaties. Section 35 of the Constitution Act, 1982, recognizes and affirms Aboriginal and Treaty rights in Canada.

We recognize that African Nova Scotians are a distinct people whose histories, legacies, and contributions have enriched the part of Mi'kma'ki known as Nova Scotia for over 400 years.

Course Instructor(s)

Name	Email	Office Hours
Christiane Zoghbi	christiane.zoghbi@dal.ca	F 9:30 - 11:00 Or by appointment LSC, 3rd Floor, Room 3085
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Course Description

This course is an introduction to physical hydrology – the science of the processes governing water availability, droughts, and floods. In this course we cover both the theoretical and applied approaches to Hydrology. Fundamental theoretical hydrology covered in this course focuses on processes and mechanisms of water storage and flow in the atmosphere, at the land/atmosphere interface, in soils, and in routing water through the landscape. Applied hydrology concepts in this class applies theoretical concepts as a basis for making informed decisions concerning water resource development and the impact of land cover change on water resources.

Course Prerequisites

MATH 1000.03 or MATH 1215.03 and one of ENVS 1000.06, SUST 1001.06, ERTH 1080.03, or ERTH1090.03, or one of SCIE 1502XY.21/SCIE 1504.27/ SCIE 1510XY.33, and completion of 2 years of an undergraduate degree. PHYC 1280.03 and 1290.03 (or PHYC 1300X/Y.06) and MATH 1010.03 are recommended.

Student Resources

A teaching assistant will be available during their office hours to discuss any questions regarding the laboratory sessions. Office hours and contact details will be shared with students on Brightspace.

Course Structure

Course Delivery

In-person. Lectures will not be recorded. Students are expected to attend all classes and laboratories in person. If unable to attend, use the student declaration of absence form. For extended absences, contact the instructor and the Associate Dean of Science.

Lectures

M, W 8:35-09:55 am Studley LSC-COMMON AREA C338

Laboratories

Four per term *M 10:05-11:25 am Outdoor locations and/or Studley LSC-COMMON AREA C338*

Course Materials

- Textbook: Dingman, S.L., 2014, Physical Hydrology. Third Edition. Waveland Press, Inc. ISBN-13: 978-1478611189.
- The course syllabus, discussions, slides, laboratory instructions, announcements, assignments, out-of-text readings, and other pertinent information will be on the course BLS site. You are expected to check this site regularly.

Assessment

Semester grades are based on:

Component	Weight (% of final grade)	Due Date (2025)
Midterm exam (70 minutes)	20	Oct 29
Lab Assignments (3)	35	Oct 24, Nov 21, Dec 10
In-class Participation & Attendance	10	Ongoing
Final exam (3h)	35	Final Exam Period

Lab Assignments

There will be a total of four lab assignments during the semester, held either in class or in the field. Field trip labs may be rescheduled in the event of fire warnings, national park closures, or other unforeseen circumstances. For each lab, students must submit a professionally written report. Collaboration is permitted, but each student must submit their own report unless

otherwise instructed. Students must indicate the names of collaborators and include a written declaration that the work was shared equally among the authors. All lab reports must be submitted via Brightspace. Emailed submissions will not be accepted.

Lab	Assignment Date	Due Date
Lab 1 (In-class)	October 6, 2025	October 24, 2025
Lab 2 (Field Trip - Little Sackville River)	October 20, 2025	November 21, 2025
Lab 3 (In-class)	November 17, 2025	December 10, 2025
Lab 4 (In-class, no report)	December 1st, 2025	N/A

Midterm/Final exams

The midterm exam (20% of final grade) will be held on **Wednesday, October 29** in class (duration: 70 minutes).

The course has a final exam weighing 35% of the total grade. It will take place during the **final exam period.**

Exams contain a mix of multiple choice, short answer, paragraph-answer, calculation, and graph-and-draw questions. Drawings and diagrams on tests or lab reports must be completely labeled, legible, and precise. Points may be deducted for spelling, incomplete sentences (except where point form is specified) and other grammatical errors.

Other course requirements

Participation will be assessed based on your regular attendance and active engagement in class activities. This may include responding to multiple-choice questions during class, uploading problem solutions to Brightspace, or contributing to discussion forums on Brightspace.

Conversion of numerical grades to final letter grades follows the Dalhousie Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (0-49)
A- (80-84)	B- (70-72)	C- (55-59)	

Course Policies on Missed or Late Academic Requirements

1. Assignments submitted late and without an approved extension will be deducted 10% per day.

2. Extensions for assignments are granted for exceptional circumstances, using the Student Declaration of Absence Form. SDAs must be uploaded to Brightspace 24 hours before the assignment or exam due. The Student Declaration of Absence Form may be used two times this semester.
3. Missed assignments: if you do not complete an assignment and do not submit a Student Declaration of Absence form, your mark on the assignment is zero.
4. There will be no make-up midterm; if you miss your midterm due to illness, family emergency, or other acceptable reason, the final exam will have a higher value (55%).
5. A make-up date will be scheduled for the final exam, which may take place either before or after the semester break (i.e. January). As per University regulations, you may only write the make-up exam under exceptional circumstances:
   "A student requesting an alternative time for a final examination will be granted that request only in exceptional circumstances. Such circumstances include illness (with a medical certificate) or other mitigating circumstances outside the student's control, including technology failure in the case of online examinations." For the full text, refer to the Undergraduate Academic Calendar 2025/2026: Policy for the Scheduling of Courses/Examinations

Course Policies related to Academic Integrity

Feel free to use AI-driven tool to assist you in learning but remember that the objective is for you to acquire these competencies and outcomes in this course. You are responsible for all work that you produce, whether assisted by an AI-driven tool or not. You must acknowledge all tools used to assist you. If applicable, you must provide links to chat logs. If the work that you produce is suspected to misrepresent your own competencies, you may be asked to complete a supplemental assessment to evaluate your mastery of course outcomes.

Learning Objectives

Following active participation in this course you will be able to:

1. Explain the definition of hydrology.
2. Explain and use the fundamental dimensions, units, and physical laws of hydrology.
3. Explain what a watershed is, how to delineate it, and why it is the basic unit of hydrology.
4. Explain the components of the hydrological cycle and calculate the water balance and mean residence time using steady state box models.
5. Describe the mechanisms controlling how water moves through the land phase of the water cycle, both numerically and theoretically, in particular, the processes driving
   a. Precipitation,

b. Evapotranspiration,
c. Infiltration,
d. Groundwater, and
e. Runoff and Streamflow,

6. Manipulate and analyze hydrologic time series data.
7. Make basic hydrologic field measurements and discuss the quality of common hydrologic measurements.

Course Content

Week	Date	Lesson Topic(s)	Reading	Assessment
1	Sep 22-26	About the Course	Chapter 1	
2	Sep 29 - Oct 3	Introduction to Hydrology	Chapters 1 & 2	
3	Oct 6-10	Surface-Atmosphere Water and Energy Exchange Lab 1: Mapping watershed boundaries, the water balance	Chapter 3	
4	Oct 13-17	Precipitation	Chapter 4	
5	Oct 20-24	Snow Lab 2: River monitoring and measurement (Little Sackville River)	Chapter 5	
6	Oct 27-31	Evapotranspiration **MIDTERM**	Chapter 6 **MIDTERM**	**MIDTERM**
7	Nov 3-7	Principles of subsurface flow	Chapter 7	Lab 1 due
	STUDY BREAK			
8	Nov 17-21	Infiltration and water movement in soils Lab 3 Soil measurement (in Long Lake Park)	Chapter 8	Lab 2 due
	Nov 24-28	Groundwater-surface-water interactions and wetlands	Chapter 9	
9	Dec 1-5	Runoff Generation and Streamflow Lab 4 Flood trends in Nova Scotia	Chapter 10	
11	Dec 8-10	Runoff Generation and Streamflow Review	Chapter 10	Lab 3 Due

University Policies and Statements

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit or e-mail the Indigenous Student Centre at 1321 Edward St or elders@dal.ca. Additional information regarding Mi'kmaq and Indigenous Relations (including the Elders in Residence program, Land Acknowledgements, Understanding Our Roots, and much more) can be found at: https://www.dal.ca/about/mission-vision-values/mikmaq-indigenous-relations.html

Internationalization

At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." Additional internationalization information can be found at: https://www.dal.ca/about/mission-vision-values/global-relations.html

Academic Integrity

At Dalhousie University, we are guided in all our work by the values of academic integrity: honesty, trust, fairness, responsibility, and respect. As a student, you are required to demonstrate these values in all the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. Additional academic integrity information can be found at: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion, please contact the Student Accessibility Centre (https://www.dal.ca/campus_life/academic-support/accessibility.html) for all courses offered by Dalhousie with the exception of Truro. For courses offered by the Faculty of Agriculture, please contact the Student Success Centre in Truro (https://www.dal.ca/campus_life/ssc.html).

Conduct in the Classroom – Culture of Respect

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). Additional diversity and inclusion information can be found at: https://www.dal.ca/about/mission-vision-values/equity-diversity-inclusion-and-accessibility/about-office-equity-inclusion.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner - perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. The full Code of Student Conduct can be found at: https://www.dal.ca/content/dam/www/about/leadership-and-governance/governing-bodies/code-student-conduct.pdf

Fair Dealing Policy

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. Additional information regarding the Fair Dealing Policy can be found at: https://www.dal.ca/content/dam/www/about/leadership-and-governance/university-policies/fair-dealing-policy.pdf

Student Use of Course Materials

Course materials are designed for use as part of this course at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading to a commercial third-party website) may lead to a violation of Copyright law.