

ERTH 3205A PHYSICAL HYDROGEOLOGY – WINTER 2021

INSTRUCTOR: Angela. L. Gulley, P.Geo.

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Office Hours on **BBB**: Monday, 10:30am to 11:00 am

Thursday, 9:30 to 10:00am

Or by appointment.

TEACHING ASSISTANTS: TBA

TA Office hours: TBA

CLASS SCHEDULE:

Lectures: Monday, 8:35 - 10:25am (pre-recorded & posted prior to timeslot)

Lab: A01 Monday, 11:35am - 2:25pm (BBB access to instructor &/or TAs)

TEXTBOOK: There is no mandatory textbook for this course however I recommend acquiring a copy of Freeze, R.A. and Cherry, J.A., 1979, Groundwater, Prentice Hall. It's an excellent reference. Freeze and Cherry is still considered the definitive textbook of hydrogeology and is the one book that will always be found on a consultant's or researcher's book shelf. This great reference has been graciously provided in pdf format by the authors and publisher on the website Hydrogeologists without Borders. Other useful reading resources are listed below.

Learning Outcomes: This course is an introductory examination of the physical principles of deep- to shallow groundwater flow within the Earth's crust, and an introduction to the exploration, development and management of groundwater as a global resource. The course builds on the student's basic knowledge of bedrock and surficial geology and introduces how a fluid can exist within and flow through earth materials. At the completion of the course the student will be able to:

- Explain the role of groundwater within the hydrological cycle.
- Apply principles of groundwater flow and knowledge of aquifer properties to quantify the magnitude and direction of groundwater movement.
- Relate geological structures/features to groundwater resources.
- Understand how groundwater is stored and released within aquifers.
- Evaluate groundwater resources using pumping tests.

SCHEDULE: Lecture topics will follow the order listed below. Assignments are designed to reinforce the theoretical material covered in the lectures, by providing practical problems, exercises and problem sets.

Lecture	Topic	Reference chapters in F&C
1	Introduction / Hydrologic Cycle	1
2, 3, 4, 5, 6	Physical Properties & Principles of Groundwater Flow	2, 5, 6
7	Groundwater Geology /Groundwater Resource	4, 8
8, 9, 10, 11	Groundwater Resource Evaluation	8

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EVALUATION:

Laboratory Assignments	45%
Midterm Test	20%
Final Exam	35%

Laboratory assignments will range from 1 to 3 weeks in duration and will be due on the date specified before the beginning of the next lab time slot (11:00am E.S.T.). The midterm and the final exam cover both lecture and laboratory assignment material. The midterm will be scheduled for **Monday, February 22nd**. The final exam will be scheduled within the regular examination period in April.

Late Policy: The late policy for this class is designed to be fair to students who hand their work in on time. Without a legitimate excuse, **all late submissions will be penalized 10% per day** and will not be graded after the assignment has been graded for the remainder of the class.

ADDITIONAL READINGS:

The following are materials that you may find useful as supplementary sources of information, and the two journals listed are for those interested in more in-depth research of certain hydrogeologic topics.

Handbooks:

Driscoll, F.G., 1986. Groundwater and Wells, Second edition. Published by Johnson Division, St. Paul, Minnesota.

Kruseman, G.P. and de Ridder, N.A., 1990. Analysis and Evaluation of Pumping Test Data. International Institute for Land Reclamation and Improvement, Netherlands.

Other textbooks and Journals such as:

Fetter, C. W., 2014. Applied Hydrogeology, 4th Edition, Prentice Hall.

Groundwater (Journal of the National Groundwater Association)

Hydrogeology Journal (Official Journal of the International Association of Hydrogeologists)

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CENTRE FOR STUDENT ACADEMIC SUPPORT

The Centre for Student Academic Support (CSAS) is a centralized collection of learning support services designed to help students achieve their goals and improve their learning both inside and outside the classroom. CSAS offers academic assistance with course content, academic writing and skills development. Visit CSAS on the 4th floor of MacOdrum Library or online at: carleton.ca/csas.

ACADEMIC INTEGRITY

It is your responsibility to review Carleton's policy on Academic Integrity.

<https://carleton.ca/registrar/academic-integrity/>

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Plagiarism

*The instructor is required to report all incidents (or suspected incidents) of plagiarism to the Dean. **All submitted work must be your own.*** Plagiarism and cheating are viewed as being particularly serious and the sanctions imposed are accordingly severe. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy. The Policy is strictly enforced and is binding on all students. Plagiarism and cheating – presenting another's ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the graduate degree. Academic dishonesty in any form will not be tolerated. Students who infringe the Policy may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; a refusal of permission to continue or to register in a specific degree program; academic probation; or a grade of Failure in the course.

Course Outline (Syllabus) Information on Academic Accommodations

Requests for Academic Accommodation

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

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, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/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, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. carleton.ca/pmc

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 its 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: carleton.ca/sexual-violence-support

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. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline.