

APPLIED SCIENCE AND MANAGEMENT DIVISION
SCHOOL OF SCIENCE
GEOL 210
3 Credit Course
Winter, 2019



COURSE OUTLINE

GEOL 210

Hydrogeology

3 CREDITS

PREPARED BY: Joel Cubley, Instructor

DATE: 3/12/2018

APPROVED BY: Margaret Dumkee, Dean

DATE: 3/12/2018

APPROVED BY ACADEMIC COUNCIL: April 2014

RENEWED BY ACADEMIC COUNCIL: August 2017



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SCHOOL OF SCIENCE
GEOL 210
3 Credit Course
Winter, 2019

Hydrogeology

INSTRUCTOR: Dr. Joel Cubley

OFFICE HOURS: Tuesday 2-4 pm

OFFICE LOCATION: T1090

CLASSROOM: CNIM M111

E-MAIL: jcubley@yukoncollege.yk.ca

TIME: T/Th 9:00 am - 10:30 pm (lect.)
Th 1:00 pm - 4:00 pm (lab.)

TELEPHONE: (867)456-8605

DATES: Jan. 3 - Apr 10, 2019

COURSE DESCRIPTION

This course provides an introduction to hydrogeology and addresses linkages between surface water, groundwater, and mining-related contaminants. Course topics include the hydrologic cycle, principles of groundwater flow, properties of aquifers, and an introduction to standard hydrogeologic testing (e.g. pump and slug tests). Students will learn to determine or predict water balances within areas of investigation, describe porous media, and characterize fluid flow in the subsurface. An introduction to the installation and maintenance of water wells and piezometers will also be provided. Students will learn to identify and differentiate the major types of groundwater contaminants, the sources of contamination, and the various criteria and standards that are applied to contaminants in groundwater particularly in the North.

PREREQUISITES

Mathematics 12 OR Yukon College equivalent, MATH 060 and GEOL 105 OR permission from the instructor.

EQUIVALENCY OR TRANSFERABILITY

Simon Fraser University - EASC 2XX (3)

University of British Columbia - EOSC 2XX (3)

University of British Columbia Okanagan - EESC 2XX (3)

LEARNING OUTCOMES

Upon successful completion of the course, students will have demonstrated the ability to

- describe the value of groundwater as a resource in terms of human and natural systems, and define the controls of water quantity, quality, and distribution at the earth's surface.
- identify the basic principles governing the flow of water in the subsurface environment and the interaction of water with different geological media and the geochemical environment.
- describe the physical properties of reservoirs in the subsurface (e.g. aquifers).
- identify sources of groundwater contamination and controls on contaminant transport, with a focus on mining-related contaminants.
- explain the process of borehole drilling and installation of monitoring wells and piezometers, as well as identify different water pump types and groundwater sampling protocols.
- process data from aquifer tests (e.g. pump and slug tests) and critically analyse the results to better understand flow systems and aquifer characteristics.

COURSE FORMAT:

This course consists of two 90-minute lectures and one three-hour lab period per week. The schedule included in this course outline details the major topics covered throughout lecture. Labs are complimentary to lecture material. Labs and lectures will be conducted in classroom, computer lab, and field settings.

ASSESSMENTS

Attendance & Participation

Students are strongly encouraged to attend all lectures and laboratory exercises. Lab exercises can be completed only during lab periods and materials may not be available outside these hours. Off-campus field exercises must be completed during the allocated time with the instructor present.

Assignments

Weekly lab exercises will be due at the start of the following lab session unless otherwise indicated by the lab instructor. Two lab exercises will require a formal report-style write-up, with requirements clearly outlined during the laboratory period. A term project will be assigned at the start of the semester. This project will require independent research and will primarily be completed outside of class time.

Tests

There will be three exams in this course: a midterm lecture exam, a final lab exam and a final lecture exam. Students must pass the lecture final exam to achieve an overall passing grade.

EVALUATION

<i>Tests and Assignments</i>	<i>Weight</i>	<i>Dates</i>
Weekly Lab Assignments	35%	Due at the start of each subsequent lab session.
Midterm Exam	15%	During a regular lecture period approximately midway through the course.
Final Lab Exam	15%	During scheduled lab session in the final week of classes.
Final Lecture Exam	20%	During the final exam period.
Term Project	15%	Due at the end of the semester (due date set by instructor).

REQUIRED TEXTBOOKS AND MATERIALS

Fetter CW. 2001. Applied hydrogeology. 4th ed. Upper Saddle River (NJ): Prentice-Hall. 598 p. (recommended purchase)

ACADEMIC AND STUDENT CONDUCT

Information on academic standing and student rights and responsibilities can be found in the current Academic Regulations that are posted on the Student Services/ Admissions & Registration web page.

PLAGIARISM

Plagiarism is a serious academic offence. Plagiarism occurs when students present the words of someone else as their own. Plagiarism can be the deliberate use of a whole piece of another person's writing, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material. Whenever the words, research or ideas of others are directly quoted or paraphrased, they must be documented according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.). Resubmitting a paper which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the College.

YUKON FIRST NATIONS CORE COMPETENCY

Yukon College recognizes that a greater understanding and awareness of Yukon First Nations history, culture and journey towards self-determination will help to build positive relationships among all Yukon citizens. As a result, to graduate from ANY Yukon College program, you will be required to achieve core competency in knowledge of Yukon First Nations. For details, please see www.yukoncollege.yk.ca/yfnccr.

ACADEMIC ACCOMMODATION

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in section 8.0 of the Yukon College Academic Regulations

(available on the Yukon College website). It is the student's responsibility to seek these accommodations. If a student requires an academic accommodation, he/she should contact the Learning Assistance Centre (LAC) at (867) 668-8785 or lassist@yukoncollege.yk.ca.

TOPIC OUTLINE

Module	Topic
1	Groundwater and the hydrologic cycle
2	Aquifers and their properties
3	Principles of groundwater flow
4	Geology and groundwater
5	Groundwater flow to wells
6	Regional groundwater flow
7	Aquifer testing
8	Well installation, groundwater monitoring and sampling
9	Groundwater geochemistry
10	Groundwater contamination: major types, sources, and transport; contaminant remediation strategies