



Course Descriptor

CVEN554 HYDROGEOLOGY & GROUNDWATER CONTAMINATION

Proposed Academic Year	2020-2021	Last Reviewed Academic Year	Fall 2020
Course Code	CVEN554	Course Title	Hydrogeology and Groundwater Contamination
Credit hours	3	Level of study	4 th Year
College / Centre	COE	Department	Civil and Environmental
Co-requisites	None	Pre-requisites	None

1. COURSE OUTLINE

The course provides the information about subsurface flow, confined and unconfined aquifers, solutions of groundwater flow equation, estimation of aquifer properties, analysis of multiple well systems, design of well fields, design of aquifer pumping tests, groundwater quality, contaminant transport models, and computer models.

2. AIMS

[The course provides students with concepts and techniques that enable to understand the hydrogeology and groundwater contamination basic topics and models

3. LEARNING OUTCOMES, TEACHING, LEARNING and ASSESSMENT METHODS

Learning Outcomes (Definitive)	Teaching and Learning methods (Indicative)	Assessment (Indicative)
Upon successful completion of this course, students will be able to:		
1. Define hydrogeological factors from geologic materials, field tests, and estimates; Define subsurface conditions with hydrogeological terms	Lectures	Assignments and in-class tests
2. Apply numerical and analytical modeling methods to emulate groundwater flow in ideal and non-ideal aquifer systems	Lectures and Computer lab	Assignments, mini project and in-class tests
3. Distinguish the significance of groundwater quality in respect of regional flow descriptions and water resource development	Lectures	Assignments and in-class tests
4. define groundwater contamination sources and strategies to avoid and mitigate them	Lectures	Assignments and in-class tests



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4. ASSESSMENT WEIGHTING

Assessment	Percentage of final mark (%)
Assignments	8%
Mini Project	12%
Quizzes	
etc	
etc	
First Mid-term	20%
Second Mid-term	20%
Final Examination	40%
TOTAL	100%

5. ACHIEVING A PASS

Students will achieve **3** credit hours for this course by passing **ALL** of the course assessments and achieving a **minimum overall score of 50%**

NB *Ensure that ALL learning outcomes are taken into account

6. COURSE CONTENT (Indicative)

Elements of hydrologic Cycle	
Connections between geological and geotechnical information to hydrogeological and hydraulic parameters	
Describe, measure and estimate hydraulic parameters	
Apply of Darcy's Law for horizontal and vertical flow	
Radial and Spherical flow to wells	
Performance and analyses of slug tests for aquifer parameters	
Performance and analyses of pump tests for aquifer parameters	
Experiment 1: Sediment transport	
Apply superposition principles to aquifer boundaries and well interference	
Understand the procedures of well drilling, construction, and rehabilitation	
Define the patterns of the regional groundwater flow	
Groundwater chemistry and quality	
Sources and characteristics of groundwater contamination	
Contaminants fate and transport in groundwater	
Groundwater remediation strategies	
TOTAL HOURS	45
Plus RECOMMENDED INDEPENDENT STUDY HOURS	90
TOTAL COURSE HOURS	135



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7. RECOMMENDED READING

Core text/s:

Freeze R. and Cherry J. (2011). *Groundwater*, 5th Ed, Prentice Hall, Englewood Cliffs, NJ.

Library + online resources:

Joel, G. (2010) *Isotope Hydrology: A Study Of The Water Cycle*, Imperial College Press, London,
<https://eds.b.ebscohost.com/eds/ebookviewer/ebook?sid=57ca03a6-55b5-41bd-a1a5-1645f425025f%40pdc-v-sessmgr02&vid=0&format=EB>.

Dominic, T. (2011). *Water Engineering*, Nova Science Publisher, NY Inc,
<https://eds.b.ebscohost.com/eds/ebookviewer/ebook?sid=d01361da-c49a-41b1-a2b8-4682098f7125%40pdc-v-sessmgr01&vid=0&format=EB>