1.	Title of the course	Groundwater Modelling
2.	Course number	CE509L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To CE5113/3
6.	To be offered by	Department of Civil and Environmental Engineering
7.	To take effect from	July 2022
8.	Prerequisite	Groundwater Hydrology
9.	**Course Objective(s):** This course is designed to introduce students to the mathematical modelling of groundwater flow and contaminant transport. This course will focus on describing the problem domain, selecting appropriate boundary conditions, assigning model parameters and calibrating them. The course will involve hands-on development of simple 2-dimensional modelling tools, as well as application of existing software for more complex simulations.	
10.	**Course Content:** What is a model? Why model? Governing equations and numerical methods, Conceptual model, Boundary Conditions, Sources and Sinks, Transient simulations – Initial conditions and Storage Parameters, Model simulation and calibration, Predictive modelling, Particle Tracking and advective transport of conservative solutes, Advanced Topics: Unsaturated flow, Multiphase flow, Fractured media, Density-dependent flow.	
11.	**Textbook(s):** 1. Anderson M P, Woessner W W and Hunt R J, *Applied groundwater modeling: simulation of flow and advective transport*, Academic press (2015).	
12.	**Reference(s):** 1. Wang H F, & Anderson M P, Introduction to groundwater modeling: finite difference and finite element methods, Academic Press, 1995. 2. Bear J, *Hydraulics of groundwater*, Courier Corporation (2012).	