Groundwater Modeling

Code	Credit Hours
CE- 856	3-0

Course Description

The purpose of this course is to give students a concise introduction to flow through porous media. Further, apply GIS data to develop rational groundwater simulations with MODFLOW.

Reference Books:

1. Ken Rushton, Groundwater Hydrology: Conceptual and Computational Models, John Wiley & Sons, 2003
2. George F. Pinder, Groundwater Modeling Using Geographical Investigation Systems, John Wiley & Sons, 2002
3. William C. Walton, Groundwater Modeling Utilities, Lewis Publishers Inc., 1992
4. Karel Kovarik, Numerical Models in Groundwater Pollution (Book & CD-ROM), Springer Verlag, 2000
5. W.-H. Chiang & W. Kinzelbach, 3-D Groundwater Modeling with PMWIN (with CD-ROM), Springer-Verlag, 2001
6. K. R. Rushton & S. C. Redshaw, Seepage and Groundwater Flow, John Wiley & Sons, 1979
7. Karlheinz Spitz & Joanna Moreno, A Practical Guide to Groundwater and Solute Transport Modeling, Interscience, 1996.

Prerequisites

Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Term	30%
ESE	50%

Teaching Plan

Week No	Topics	Learning Outcomes
1-2	Review of fundamental equations	Continuity equations, steady state flow, time variant flow, idealizations

3-5	Finite difference formulations	Space discretization, time, explicit and implicit forms, boundary conditions, and solution techniques
6	**MID TERM IN WEEK 9**	
7-8	Seepage analysis	Steady seepage, confined, unconfined, fields problems, time variant seepage
9	**MID TERM EXAM**	
10-13	Regional groundwater flow	Governing equations, data requirements and processing, one and multi-dimensional flow
14-17	Numerical pumping test analysis	Derivation of a model, standard problems, vertical flow components, delayed yield concepts
18	**End Semester Exam**	