

## **ADVANCED MODELING OF SUBSURFACE FLOW AND TRANSPORT**

3-0-0-0-9

Review of Governing Equations: Definition of Variables, Phase Equations, Component Equations, Initial and Boundary Conditions, constitutive relationships. Review of Numerical Methods: Finite Difference Methods, Finite Element Methods, Other Relevant Methods. Simulation of Groundwater Flow: Finite Difference and Finite Element Formulations. Simulation of Contaminant Transport: Finite Difference and Finite Element methods, Improved Eulerian Methods, Fourier analysis, Characteristic Methods. Simulation of Multiphase Flow and transport with emphasis on unsaturated flow and Transport; Introduction to existing packages for simulation of subsurface flow and transport The course will involve two major modeling and simulation projects, one for flow and other for combination of flow and transport. The students will have to make presentations of their results.