CE6480 – Contaminant Transport Modelling

Credit Distribution: C:9 L:3 T:0 P:0 E:0 O:6 TH:0

Course Type: Theory

Description: Introduction: Transport phenomenon, diffusion, dispersion, advection, adsorption, conservative and non-conservative pollutants, sources and sinkspoint and non-point, Governing equations for flow and transport in surface and sub-surface waters, chemical and biological process models, simplified models for lakes, streams and estuaries. Model complexity: Selection and Development, model resolution, coupled and uncoupled models, linear and non-linear models, solution techniques, data requirements for calibration, application and evaluation of environmental control, bio-remediation. Numerical models: FDM, FEM and Finite volume techniques, explicit vs implicit methods, numerical errors, and stability. High resolution techniques. Stream quality modeling using QUAL2E, Groundwater transport modeling using SUTRA.

Course Content: Surface flow- Governing equations for flow and transport, advection, turbulent diffusion, dispersion; Reactive transport: chemical and biological process models; Model complexity: selection and development; Water quality models for rivers and estuaries, Solution techniques – Finite-difference, Finite Volume, Finite Element methods; Explicit and implicit methods; Numerical errors, stability and convergence, Coupled and uncoupled models; Calibration; Management models, Software Packages: QUAL2K and WASP models, Subsurface Flow –Governing equations for flow and transport; advection, mechanical dispersion; Reactive transport: adsorption, chemical and biological process models, Equations for saturated flows and unsaturated flows; Bio-remediation of aquifers; Solution techniques, Software Packages: MODFLOW, MT3D.

Text Books: NIL

Reference Books: NIL

Prerequisite: NIL