

CE760a: Surface Water Quality Modeling**3-0-0-0 [5], modular**

Introduction: concepts of scale in natural systems, brief review of the fate processes in the environment, examples of natural systems, principles of model formulation, calibration, validation, error estimation and sensitivity analysis; Derivation of generalized mass balance equation for contaminants in incompressible fluid (water) in the non-inertial frame of reference; River Modeling: one dimensional advection-dispersion-reaction model, river properties and estimation of parameters, different forcing situations (point, non-point, aerial sources and sinks), sediment water interaction; Estuary Modeling: types and properties, flow characterization, advection-dispersion models, salt gradient box models; Lake Modeling: box models, generalized models, special considerations for large lakes, sediment mixing and interaction with water column; Wetlands: box models for flow, equilibrium and kinetic geochemical models for red-ox reactions, transport of heavy metals.