

**Class Schedule for Applied Stochastic Subsurface Hydrology & Environmental Geophysics**

Time	March 16th, 2004	March 17th, 2004	March 18th, 2004	March 19th, 2004
08:00-08:50	<b>Porous Media Hydraulic Properties 1:</b> pressure, elevation & hydraulic head; Darcy's law, saturated hydraulic conductivity, specific storage, transmissivity, storage coefficient, effective parameters anisotropy, and scale issues <b>(Yeh)</b>	<b>Basic Electromagnetic Theory:</b> Maxwell equations, constitutive equations, wave nature of EM fields, electromagnetic impedance, polarization <b>(Daniels)</b>	<b>Intro to Surface Geophysical Surveys 1:</b> seismic, gravity, electrical, EM, and GPR <b>(Daniels)</b>	<b>Diffusion and Dispersion 1:</b> molecular diffusion, diffusion equation, advection-diffusion equation, dispersion, convection-dispersion equation <b>(Yeh)</b>
08:50-09:00	Break	Break	Break	Break
09:00-09:50	<b>Porous Media Hydraulic Properties 2:</b> positive/negative pressure head, Darcy's law, unsaturated hydraulic conductivity curve, moisture release curve, moisture capacity term, hysteresis, and anisotropy <b>(Yeh)</b>	<b>Stochastic Representation of Heterogeneity 1:</b> probability, stochastic processes, joint probability distribution, spatial moments, second-order stationarity, ergodicity <b>(Yeh)</b>	<b>Intro to Surface Geophysical Surveys 2:</b> seismic, gravity, electrical, EM, and GPR <b>(Daniels)</b>	<b>Diffusion and Dispersion 2:</b> molecular diffusion, diffusion equation, advection-diffusion equation, dispersion, convection-dispersion equation, spatial and temporal moment analysis, parameter estimation <b>(Yeh)</b>
09:50-10:00	Break	Break	Break	Break
10:00-10:50	<b>Governing Flow Equations:</b> saturated and unsaturated porous media flow, boundary and initial conditions, steady and unsteady infiltration and evaporation pressure head profiles <b>(Yeh)</b>	<b>Stochastic Representation of Heterogeneity 2:</b> Covariances, correlations, correlation scales, semivariograms, sills, ranges, characterization of heterogeneity <b>(Yeh)</b>	<b>Borehole Geophysics:</b> <b>(Daniels)</b>	<b>Solute Transport Models:</b> saturated, unsaturated, homogeneous, and heterogeneous media <b>(Yeh)</b>
10:50-11:00	Break	Break	Lunch	Break
11:00-12:00	<b>Pressure &amp; Moisture Distributions:</b> steady and unsteady infiltration and evaporation conditions, sensitivities of hydraulic responses to hydraulic properties <b>(Yeh)</b>	<b>Unconditional Effective Parameter Approach:</b> stochastic formulae for upscaled effective parameters, examples of applications, Monte Carlo simulations <b>(Khaleel)</b>	<b>Spatial Moment Analysis:</b> estimation of effective hydraulic parameters with Hanford data <b>(Khaleel)</b>	<b>Cross-Borehole Geophysics:</b> <b>(Hubbard)</b>
12:00-01:00	Lunch	Break	Break	Lunch
01:00-01:50	<b>Fundamentals of Electromagnetism:</b> electric, potential & magnetic fields; conductivity, resistivity, dielectric constant; petrophysical properties <b>(Daniels)</b>	<b>Conditional Effective Parameter Approach:</b> Kriging and co-Kriging <b>(Yeh)</b>	<b>Simulation of Hanford Injection:</b> equivalent homogeneous and layered approaches <b>(Khaleel, Yeh)</b>	<b>New Technologies 1:</b> hydraulic tomography, electrical resistivity tomography, theory and case studies <b>(Yeh)</b>
01:50-02:00	Break	Break	Break	Break
02:00-03:00	<b>Software Introduction:</b> using VSAFT2 and Tecplot <b>(Yeh)</b>	<b>Inverse Problems:</b> Well/ill posed problems, necessary and sufficient conditions for saturated and unsaturated flow <b>(Yeh)</b>	<b>Model Calibration Case Study:</b> Avra Valley <b>(Yeh)</b>	<b>New Technologies 2:</b> stochastic fusion of information <b>(Yeh)</b>
03:00-04:00	<b>Flow Modeling:</b> flow simulation in variably saturated media <b>(Yeh)</b>	<b>Introduction to GSLIB:</b> applications with Avra Valley data sets <b>(Yeh)</b>	Continue	<b>Hydrogeophysics Case Studies:</b> <b>(Hubbard)</b>
04:00-05:00	Continue	Continue	Continue	Discussions and Course evaluation