

Tentative Class Schedule for "Applied Stochastic Subsurface Hydrology and Environmental Geophysics"

Time	March 16/05	March 17/05	March 18/05
08:00-08:50	HYDRAULIC PROPERTIES OF VARIABLY SATURATED POROUS MEDIA: (1) , Pressure head, elevation head, hydraulic head, Darcy's Law, saturated hydraulic conductivity, specific storage, transmissivity, storage coefficient, effective parameter concept, anisotropy, and scale issues (Khaleel).	INTRODUCTION TO SURFACE GEOPHYSICAL SURVEYS: (1) , Seismic, gravity, electrical, em, and gpr (Daniels).	CROSS-BOREHOLE GEOPHYSICS (Hubbard).
08:50-09:00	Break	Break	Break
09:00-09:50	HYDRAULIC PROPERTIES OF VARIABLY SATURATED POROUS MEDIA: (2) , Positive/negative pressure head, Darcy's Law, unsaturated hydraulic conductivity curve, moisture release curve, moisture capacity term, hysteresis, and anisotropy (Khaleel).	INTRODUCTION TO SURFACE GEOPHYSICAL SURVEYS: (2) , Seismic, gravity, electrical, em, and gpr (Daniels).	HYDROGEOPHYSICS CASE STUDIES (Hubbard).
09:50-10:00	Break	Break	Break
10:00-10:50	GOVERNING FLOW EQUATIONS: Flow through saturated and unsaturated porous media, boundary and initial conditions, general behaviors of pressure distributions under steady and unsteady infiltration and evaporation conditions (Yeh).	DIFFUSION AND DISPERSION CONCEPT: (1) , Molecular diffusion, diffusion equation, advection-diffusion equation, dispersion, convection-dispersion equation (Yeh).	INVERSE PROBLEMS (MODEL CALIBRATION): Well/ill posed inverse problems. Necessary and sufficient conditions for a well-posed problem in saturated and unsaturated flow (Yeh).
10:50-11:00	Break	Break	Break

11:00-11:50	GENERAL BEHAVIORS OF PRESSURE AND MOISTURE DISTRIBUTIONS Under steady and unsteady infiltration and evaporation conditions. Sensitivities of hydraulic responses to hydraulic properties (Yeh).	DIFFUSION AND DISPERSION CONCEPT: (2) , Molecular diffusion, diffusion equation, advection-diffusion equation, dispersion, convection-dispersion equation, spatial and temporal moment analysis, parameter estimation (Yeh).	MODEL CALIBRATION: CASE Study (Avra valley): A structured and systematic approach to ease your model calibration efforts (Yeh).
11:50-01:00	Lunch	Lunch	Lunch
01:00-01:50	FUNDAMENTALS OF ELECTROMAGNETICISM: (1) , Electric, potential, magnetic fields; conductivity, resistivity, dielectric constant; petrophysical properties (Daniels).	STOCHASTIC REPRESENTATION OF HETEROGENEITY (1) : Probability, stochastic processes, joint probability distribution, spatial moments, second-order stationarity, ergodicity (Yeh).	TRADITIONAL AQUIFER & TRACER TESTS : What do you estimate? Are you comparing apples to oranges? TRADITIONAL MODELING APPROACHES : Do you know what you predict? (Yeh).
01:50-02:00	Break	Break	Break
02:00-02:50	FUNDAMENTALS OF ELECTROMAGNETICISM: (2) , Electric, potential, magnetic fields; conductivity, resistivity, dielectric constant; Petrophysical properties (Daniels).	STOCHASTIC REPRESENTATION OF HETEROGENEITY (2) : Covariances, correlations, correlation scales, semivariograms, sills, ranges, characterization of heterogeneity (Yeh).	NEW TECHNOLOGIES : Hydraulic tomography and Electrical Resistivity Tomography (Theory and Case Studies) (Yeh).
02:50-03:00	Break	Break	Break
03:00-03:50	LUMPED PARAMETER MODELS FOR GROUNDWATER QUANTITY AND QUALITY MODELING : A practical approach to a complex problem (Yeh).	UNCONDITIONAL EFFECTIVE PARAMETER APPROACH : Stochastic formulae for upscaled effective parameters and examples of their practical applications. Monte Carlo Simulations (Khaleel).	NEW TECHNOLOGIES : Stochastic Information Fusion: How to assimilate different types information to reduce uncertainties in your prediction (Yeh).
03:50-04:00	Break	Break	Break
04:00-05:00	CASE STUDIES : (Yeh).	CONDITIONAL EFFECTIVE PARAMETER APPROACH : Kriging and co-kriging and uncertainties (Yeh).	DISCUSSIONS AND COURSE EVALUATION