TENTATIVE SCHEDULE – Spring 2016
ENVS 470/570 – Soil Physics

1st to 6th Week

**Physical Properties of Soils and Other Porous Media** - Units and dimensions, definitions and basic mass-volume relationships between the solid, liquid and gaseous phases; soil texture; Stoke’s Law; particle and pore size distributions; surface area; soil structure.

**Soil Water Content and its Measurement** - Definitions; measurement methods - gravimetric, neutron scattering, gamma attenuation; and time domain reflectometry; the role of soil water storage in the water balance; field capacity concept.

**Soil Water Retention and Potential (Hydrostatics)** - The energy state of soil water; total water potential and its components; properties of water (molecular, surface tension, and capillary rise); units and calculations of potentials under equilibrium; measuring soil water potentials; soil water characteristic (retention) curves and their measurements; fitting parametric models; hysteresis.

**Lab-1**: Demonstration Lab - Particle Density; Surface Area; Particle Size Distribution
**Lab-2**: Demonstration Lab - Neutron Probe; TDR; Tensiometers; Soil Temperature *(field trip)*
**Lab-3**: Time Domain Reflectometry (TDR)

1st Exam: Tentative Date - Friday 2/26/2016

7th to 11th Week

**Water Flow in Soils: Hydrodynamics Part 1** - Laminar flow in tubes (Poiseuille’s Law); Darcy’s Law, conditions and states of flow; saturated flow; hydraulic conductivity and its measurement.

**Water Flow in Soil: Hydrodynamics Part 2** - Unsaturated steady state flow; unsaturated hydraulic conductivity models and applications; non-steady flow; approximate solutions to infiltration (Green-Ampt, Philip); field methods for estimating soil hydraulic properties.

**Lab-4**: Soil Water Characteristic (SWC)
**Lab-5**: Saturated Hydraulic Conductivity
**Lab-6**: Infiltration - Wetting Front Advance

12th to 13th Week

**Solute Transport in Soils and Salinity** - Convection and diffusion of solutes; breakthrough curves; convection-dispersion equation and solutions to pulse and continuous solute application; salt balance and salinity management.

**Lab-7**: Field Water Intake *(field trip)*

14th to 16th Week

**Soil Temperature and Heat Flow** - Soil thermal properties; steady state heat flow; nonsteady heat flow; estimation of soil thermal properties.

**Soil-Plant-Atmospheric Relations** - Radiation and energy balance; evapotranspiration and its estimation; transpiration, crop coefficients, and irrigation scheduling; surface evaporation.

**Soil Gaseous Phase and Gas Transport** - Composition of the soil gaseous phase, mechanisms for gas transport in soils, measurement of gas concentrations (O₂, CO₂, etc.)

**Lab-8**: Miscible Displacement

Final Exam: Friday 5/6/2016 from 10:30 AM to 12:30 PM