Date: **March 21**

Time: **03:00 PM**

Location: **Latrobe 107**

Speaker: **Dr. Allen Hunt**
Program Director, Hydrologic Sciences,
National Science Foundation

Title: **"Water retention, unsaturated flow, and diffusion. Results from percolation theory"**

Abstract

Percolation theory quantifies connectivity. Applied to a distribution of local hydraulic conductances, it can define subsets of the distribution, for which the connectivity jumps from zero to a finite value. If a subset is chosen with the largest possible minimum value of the conductance, g, such that the connectivity is non-zero, then this g value characterizes the hydraulic conductivity. Using continuum percolation theory for random fractal models this application yields the hydraulic conductivity in terms of the fractal dimensionality and the critical volume fraction for percolation. The latter turns out to be the moisture content at which solute diffusion vanishes, as well as very nearly the value at which fractal scaling of the water retention curve breaks down. It then becomes possible to unify the theory of all basic transport processes within the same framework (percolation theory) and with the same fundamental parameters (fractal dimensionality, porosity, and critical volume fraction), while the results agree with experiment.