Date: **January 26th**

Time: **11:00 AM**

Location: **Maryland Hall 110**

Speaker: **Dr. Steve Wereley**
Purdue University

Title: **"What can we learn from diffusion in microfluidics?"**

Abstract

Several very different microfluidics problems, all involving diffusion, demonstrate the varying roles that diffusion can play in microfluidics and further what can be learned from diffusion in these situations. We will discuss micro- and nano-particle dynamics in applications as diverse as nanomanufacturing, biosensors, fluidic self-assembly and temperature measurement.

In the first problem presented, a rigid spherical particle translating at small tube Reynolds number in a shearing flow experiences lateral migration forces due to inertial and lubrication effects. In a suspension flow of sufficiently small particles, Brownian motion or diffusion is another important factor influencing particle migration. For small Péclet number (*Pe*), particles migrate away from the channel wall due to the wall lubrication effects, while the particle concentrations in regions remote from the wall (more than 10 particle diameters) remain nearly uniform. For larger *Pe*, particles move toward a preferred radial position. These results are consistent with existing but previously untested theories. Secondly, our research group has developed novel experimental methods in which particle diffusion is used as a local temperature or viscosity probe or, alternately, a particle sizing method.