

# Distinguished Colloquium

**Professor Horst Thieme,  
School for Mathematical and Statistics Sciences,  
Arizona State University**

**Friday, October 9, 2015  
2:00 p.m., HH-3017**

**Homogeneous Order-preserving Maps, Their Spectral Radius,  
and The Dynamics of Sexually Reproducing Populations**

**Abstract:**

The dynamics of structured populations can appropriately be described by continuous or discrete semiflows. The structural distributions of the populations are represented by points in the cone of an ordered normed vector space. The year-to-year development of the population is described by a nonlinear map on the cone. Whether the population dies out or persists is typically determined by the spectral radius of the first order approximation of the map at the zero vector (the extinction state). If mating is ignored, this first order approximation is a positive bounded linear operator; if mating is included, it is a homogeneous order-preserving map on the cone.

We introduce the cone spectral radius of bounded homogeneous maps and give various characterizations. We discuss conditions for the existence of positive eigenvectors and eigenfunctionals that are associated with the spectral radius. Their existence helps to establish the persistence of the populations that are considered.