The 11th Annual

Sobel Seminar

In honor of Dr. Milton Sobel

Guest Speaker: **Hans Mueller**
University of California, Davis.

Functional data analysis (FDA) is statistical methodology for samples of data where each sample element is a random function. For functional data that live in a linear space, Functional Principal Component Analysis has become a standard tool for obtaining practically useful and theoretically well supported representations. However, the resulting linear representations are much less useful when the data are inherently nonlinear.

Examples of nonlinear functional data are often encountered in the form of samples of random densities or otherwise nonnegative functions with constrained integral. To address the challenge that the space in which such data reside is not linear, we introduce a transformation approach, mapping probability densities to a linear function space through a continuous and invertible map. Functional modes of variation are then implemented in this linear space and the corresponding representations in density space are obtained by applying the inverse map. We report some asymptotic properties of this transformation approach and illustrate it with distributions of baby names.

Other types of nonlinearities arise when square integrable functional data lie close to an unknown low-dimensional manifold. If such a Hilbert manifold is isometric to a subdomain of R^p, one may apply distance-based manifold learning through Isomap. This approach leads to the notions of manifold mean, manifold modes of functional variation, and functional manifold components. These concepts are illustrated through various simulations and applications. This talk is based on joint work with
Dong Chen and Alexander Petersen.

Wednesday, April 16th, 2014
3:30PM

light refreshments will be
served at 3:15

UCEN—State Street Room