Dissertation Defense
Mr. Philippe Dovoedo

TITLE: Maximum Likelihood Estimation for a Heavy-Tailed Mixture Distribution

COMMITTEE: Alan Polansky, Ph.D. (Chair)
             Duchwan Ryu, Ph.D.
             Bárbara González, Ph.D.

DATE: July 1, 2019
TIME: 10:00 a.m.
PLACE: DuSable Hall 248

ABSTRACT:

In an increasingly connected global environment, “high-impact, low-probability” (HILP) events can have devastating consequences and result in large insurance losses with a heavy-tailed distribution. Examples of such events include Hurricane Katrina, the Deepwater Horizon oil disaster and the Japanese nuclear crisis and tsunami. According to the 2012 Blackett Review of HILP Risks from the UK Government Office for Science, the identification of low-probability risks, and the subsequent development of mitigation plans, is complicated by their rare or conjectural nature, and their potential for causing impacts beyond everyday experience. Extremal mixture models and more generally extreme value analysis help assess HILP risks. In this dissertation, we introduce various classes of heavy-tailed distributions before moving on to mixture models. In particular, we are interested in the mixture of a heavy-tailed distribution and a light-tailed distribution. Estimation of the mixture distribution is based on the expectation-maximization (EM) algorithm and model selection is achieved using information criteria. Our results indicate that one of the components of our mixture may provide us with a good model for modeling nonnegative, heavy-tailed data.