Indiana University-Purdue University Indianapolis
Department of Mathematical Sciences

Statistics Seminar

12:15pm—1:15pm, Tuesday, September 25, 2018
LD 265

Speaker: **Ziting Tang**
Department of Mathematical Sciences, IUPUI

Title: **Asymptotic Behavior of M-Estimators for the Linear Model**

Abstract:

This paper deals with M-estimators for the linear model $y = x_i'\theta + u_i$, 1¡ i ¡ n, where the x_i are fixed p-dimensional vectors, and the u_i are i.i.d. random variables with distribution F. Let X be the matrix whose i-th row is x_i. Then it is proved that $(\hat{\theta} - \theta)'X'X(\hat{\theta} - \theta)$ is bounded in probability assuming that ψ satisfies a set of conditions which include ψ to be monotone and X to have full rank. This implies that a sufficient condition for consistency is that the smallest eigenvalue of X'X tends to infinity. For the case in which p goes to infinity it is proved that $p^{-1}(\hat{\theta} - \theta)'X'X(\hat{\theta} - \theta)$ is bounded in probability, assuming that $p\epsilon$ goes to infinity, where $\epsilon = max(x_i'X'Xx_i)$. The asymptotic normality of these estimators is proved for both the cases of p fixed and p going to infinity. The proof of the former is an easy consequence of a result of Bickel on one-step M-estimators. In the case of p going to infinity we assume that ψ has a bounded derivative and that $p^{3/2}\epsilon$ goes to 0. This improves an analogous result by Huber, who requires $p^2\epsilon$ goes to 0.