

**Indiana University-Purdue University  
Indianapolis**  
**Department of Mathematical Sciences**

STATISTICS SEMINAR

12:15pm—1:15pm, Tuesday, February 12, 2019  
LD 265

**Speaker:** **Gang Cheng**  
*Department of Mathematical Sciences, IUPUI*

**Title:** **A Significance Test for Graph-Constrained Estimation**

**Abstract:**

Graph-constrained estimation methods encourage similarities among neighboring covariates presented as nodes on a graph, which can result in more accurate estimations, especially in high dimensional settings. Variable selection approaches can then be utilized to select a subset of variables that are associated with the response. However, existing procedures do not provide measures of uncertainty of the estimates. Moreover, the vast majority of existing approaches assume that available graphs accurately capture the association among covariates; violating this assumption could severely hurt the reliability of the resulting estimates. In this paper, the author present an inference framework, called the Grace test, which simultaneously produces coefficient estimates and corresponding p-values while incorporating the external graph information. The author showed via both theoretically and via numerical studies, that the proposed method asymptotically controls the type-I error rate regardless of the choice of the graph. When the underlying graph is informative, the Grace test is asymptotically more powerful than similar tests that ignore external information. The author further proposed a more general Grace-ridge test that results in a higher power than the Grace test when the choice of the graph is not fully informative. Numerical studies showed that as long as the graph is reasonably informative, the proposed testing methods deliver improved statistical power over existing inference procedures that ignore external information.