

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

STATISTICS SEMINAR

12:15pm—1:15pm, Tuesday, March 06, 2018
SL 137

Speaker: **Xin Xing** (PhD candidate)
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Title: **Minimax Nonparametric Test for Density Comparison**

Abstract:

Test of independence plays an important role in many statistical techniques. In particular, we investigate the problem of testing whether a continuous random variable and a discrete random variable are independent. Our method builds on the idea of performing the functional decomposition of the log-transformed density function on the tensor product reproducing kernel Hilbert space (RKHS). Similar to the classic analysis of variance (ANOVA) decomposition, the log-density function can be decomposed into the sum of ‘main effects’ and ‘interaction’. The independence testing is shown to be equivalent to testing whether the ‘interaction’ is zero. A penalized likelihood ratio test statistic is proposed, and further proven to be consistent and minimax optimal. We apply the proposed test to a problem in discovering the differentially expressed genes between the immunoglobulin heavy chain variable (IGHV) mutated and unmutated chronic lymphocytic leukemia (CLL) patients and illustrate the new methods on simulated and real data sets.