Speaker: Wenshu Dai (Binghamton University)

Title: Zero-Inflated gaussian mixed models for analyzing longitudinal microbiome data.

Abstract: The human microbiome is variable and dynamic in nature. Longitudinal studies could explain the mechanisms in maintaining the microbiome in health or causing dysbiosis in disease. However, it remains challenging to properly analyze the longitudinal microbiome data from either 16S rRNA or metagenome shotgun sequencing studies, output as proportions or counts. In this article, zero-inflated Gaussian mixed models (ZIGMMs) were proposed to analyze longitudinal microbiome data. It can include various types of fixed effects and random effects and account for various within-subject correlation structures, and can effectively handle zero inflation. An efficient Expectation-Maximization (EM) algorithm was developed to fit the ZIGMMs by taking advantage of the standard procedure for fitting linear mixed models. I'll also show that ZIGMMs outperform the previously used linear mixed models (LMMs), negative binomial mixed models (NBMMs) and zero-inflated Beta regression mixed model (ZIBR) in detecting associated effects in longitudinal microbiome data through extensive simulations.