Statistics Seminar
Department of Mathematics and Statistics

DATE:	Thursday, October 10, 2024
TIME:	1:15pm – 2:15pm
LOCATION:	WH 100E
SPEAKER:	Yangsheng Wang, Binghamton University
TITLE:	A framework for analysing longitudinal data involving time-varying covariates

Abstract

Standard models for longitudinal data ignore the stochastic nature of time-varying covariates and their stochastic evolution over time by treating them as fixed variables. There have been recent methods for modelling time-varying covariates, however those methods cannot be applied to analyse longitudinal data when the longitudinal response and the time-varying covariates for each subject are measured at different time points. Moreover, it is difficult to study the temporal effects of a time-varying covariate on the longitudinal response and the temporal correlation between them. Motivated by data from an AIDS cohort study conducted over 26 years at the University Hospitals Leuven in which the measurements on the CD4 cell count and viral load for patients are not taken at the same time point, we present a framework to address those challenges by using joint multivariate mixed models to jointly model time-varying covariates and a longitudinal response, instead of including time-varying covariates in the response model. This approach also has the advantage that one can study the association between the covariate at any time point and the response at any other time point, without having to explicitly model the conditional distribution of the response given the covariate. We use penalised spline functions of time to capture the evolutions of both the response and time-varying covariates over time.

Reference: Reza Drikvandi. Geert Verbeke. Geert Molenberghs. "A framework for analysing longitudinal data involving time-varying covariates." Ann. Appl. Stat. 18 (2) 1618 - 1641, June 2024. https://doi.org/10.1214/23-AOAS1851