Mathematics, Statistics, and Computer Science **@ UIC**

## Statistics and Data Science Seminar

*Statistical Inference for Functional Linear Quantile Regression*

Peijun Sang (University of Waterloo)

**Abstract:** We propose inferential tools for functional linear quantile regression where the conditional quantile of a scalar response is assumed to be a linear functional of a functional covariate. In contrast to conventional approaches, we employ kernel convolution to smooth the original loss function. The coefficient function is estimated under a reproducing kernel Hilbert space framework. A gradient descent algorithm is designed to minimize the smoothed loss function with a roughness penalty. With the aid of the Banach fixed-point theorem, we show the existence and uniqueness of our proposed estimator as the minimizer of the regularized loss function in an appropriate Hilbert space. Furthermore, we establish the convergence rate as well as the weak convergence of our estimator. As far as we know, this is the first weak convergence result for a functional quantile regression model. Pointwise confidence intervals and a simultaneous confidence band for the true coefficient function are then developed based on these theoretical properties. Numerical studies including both simulations and a data application are conducted to investigate the performance of our estimator and inference tools in finite sample. This is a joint work with my collaborators Zuofeng Shang and Pang Du.

Wednesday, March 30 at 4:00 PM in Zoom