## Indiana University Indianapolis Department of Mathematical Sciences

STATISTICS SEMINAR

12:15pm—1:15pm, Tuesday, January 21, 2025 Zoom Meeting: Meeting ID: 845 0989 4694

Speaker: Ting Fung Ma Department of Statistics, University of South Carolinae

## Title: Hierarchical dependence modeling for the analysis of large insurance claims data

## Abstract:

Extreme weather events associated with climate change have caused significant damages. In particular, hail storms damage millions of properties in the U.S. and result in billion-dollar insured losses each year in the recent decade. To facilitate the insurance claims management operations in insurance companies, we construct a hierarchical dependence model, which accommodates the complex dependence within and between the outcomes of interests including the propensity of filing a claim, time to report a claim, and the claim amount. The storm-specific and property-specific characteristics are incorporated through marginal models, such as generalized linear models and survival analysis models. The dependence within the hail event is captured by spatial factor copula, while the dependence between different outcomes is captured by bivariate copula. For parameter estimation we develop a two-step procedure that first maximizes the marginal likelihood function and then maximizes the pairwise likelihood, which ensures computational feasibility for big data. We apply this modeling framework to analyze a large dataset involving hail storms in Colorado from 2011 to 2015 impacting hundreds of thousands of insured properties and demonstrate that the predictive performance can be improved by our proposed methodology.

## Bio:

Dr. Ting Fung Ma is currently an assistant professor of Statistics at the University of South Carolina. He earned a Ph.D. in Statistics with a minor in Computer Sciences from the University of Wisconsin-Madison and a B.S. with a minor in Financial Engineering and a M.Phil. in Statistics from the Chinese University of Hong Kong. His research concerns the development of methodologies for data with complex dependence and big volumes, with theoretical soundness and computational feasibility. In particular, he works on projects related to spatial and spatiotemporal statistics, and various statistical applications and interdisciplinary research.