



UNIVERSITY OF CENTRAL FLORIDA

COLLOQUIUM

Adaptive Bayesian Learning for Spatio-Temporal Outbreak Detection

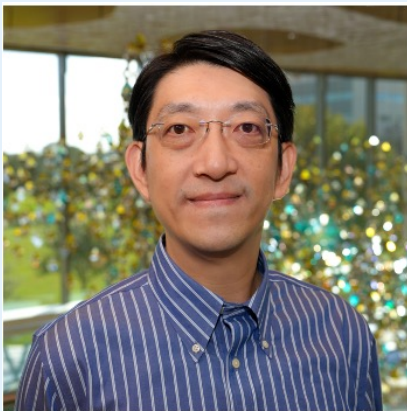
Speaker: Dr. Jian (Frank) Zou

Affiliation: College of Nursing, University of Central Florida

Abstract

How can we distinguish an emerging outbreak from random fluctuations when data arrive continuously across many locations? This question connects public-health surveillance with broader mathematical and statistical challenges in sequential learning, spatial dependence, and multiple testing. In this talk, I will present an adaptive Bayesian framework for detecting outbreaks in streaming surveillance data. The approach combines a flexible model for disease counts with sequential updating of prior distributions and adaptive combination of p-values across data sources and locations. A central challenge is balancing rapid detection against false alarms while accounting for dependence across observations. Through extensive studies spanning different signal strengths and correlation structures, we examine when adaptation improves detection and how it affects error control. We then illustrate the framework using daily COVID-19 case counts from Massachusetts counties in 2020, which demonstrates timely and stable detection during epidemic outbreaks. We will discuss the intuition behind these methods and the tradeoffs that arise when learning from sequential data in real time.

Speaker Bio



Jian (Frank) Zou is an associate professor of statistics in the College of Nursing at the University of Central Florida. His research spans Bayesian spatio-temporal modeling, biosurveillance, time series, high-dimensional statistical inference, and applications of artificial intelligence and data science in areas including public health, medicine, finance, and engineering. He earned his PhD in Statistics from the University of Connecticut and completed postdoctoral training at the National Institute of Statistical Sciences and Duke University. Before joining UCF, he held faculty positions at Indiana University–Purdue University Indianapolis and Worcester Polytechnic Institute. He is an elected member of the International Statistical Institute.

Event Details

- **Date:** Monday, October 26, 2026
- **Time:** 3:30 PM – 4:30 PM
- **Location:** MSB 318

Refreshments will be served from 2:30pm–3:30pm in MSB 201

Dr. Yvette Kanouff School of Data, Mathematical, and Statistical Sciences