

University of
CINCINNATI | DEPARTMENT OF
MATHEMATICAL SCIENCES
DIVISION OF STATISTICS AND DATA SCIENCE

Welcomes

2026 Taft Lecturer

Dr. Michele Guindani

Professor

Department of Biostatistics

Fielding School of Public Health

University of California, Los Angeles



Thursday April 9th

Rec Center Room 3230

2:00-3:00pm

Many Cities, Many Maps: Statistics for Studying Brain Heterogeneity

Brains are dynamic networks. Think of the brain as a city, where regions are neighborhoods and connectivity forms the roads. Real brain function is traffic: communication routes reconfigure over time and differ across individuals. Understanding this heterogeneity requires statistical methods that can handle high-dimensional, correlated data, distinguish signal from noise, and quantify uncertainty about change.

Statistical methods are indispensable in this setting. They provide a principled way to handle high-dimensional dependence, avoid mistaking noise for structure, and quantify uncertainty in claims about when and how the brain changes. These steps are crucial if connectivity is to become a reliable marker of individual brain functioning.

In this talk, I will describe modern statistical methods for quantifying how brain activity and connectivity vary over time and across individuals, and why that variation matters. I will focus on (i) multi-subject analyses that discover subgroups with similar activity and connectivity patterns, especially when integrated with subject-level information; (ii) unified approaches to dynamic functional connectivity that characterize time-varying network interactions directly from multivariate fMRI time series; and (iii) models that link imaging and non-imaging predictors to behavioral or clinical outcomes. To emphasize that these ideas extend across scales, I will also point to recent results in calcium imaging, where decoding noisy fluorescence recordings identifies coherent neuronal ensembles and how their coordination changes with spatial context during navigation.

The long-term goal is practical: better explanations and predictions, and more targeted strategies for clinical screening and intervention.

**Refreshments will be served after the lecture, 3:15-3:45pm in the
Math Faculty & Graduate Student Lounge - Room 4118 French Hall**