DEPARTMENT OF STATISTICS

COLLOQUIUM



Tuesday, February 13

Reception Starts At

3:00pm - 3:35pm

Where At

Olmsted Hall 1331

Colloquium Starts At

3:45pm - 4:45pm

Where At

Olmsted Hall 420

Zoom Option

Meeting ID: 929 6997 7076

Password: 966710

"MULTISCALE SPATIOTEMPORAL RECONSTRUCTION
OF SINGLE-CELL GENOMICS DATA"



Abstract

Cells make fate decisions in response to dynamic environments, and multicellular structures emerge from multiscale interplays among cells and genes in space and time. The recent single-cell genomics technology provides an unprecedented opportunity to profile cells. However, those measurements are taken as static snapshots of many individual cells that often lose spatiotemporal information. How to obtain temporal relationships among cells from such measurements? How to recover spatial interactions among cells, such as cell-cell communication? In this talk I will present our newly developed computational tools that dissect transition properties of cells and infer cell-cell communication based on nonspatial single-cell genomics data. In addition, I will present methods to derive multicellular spatiotemporal pattern from spatial transcriptomics datasets. Through applications of those methods to several complex systems in development, regeneration, and diseases, we show the discovery power of such methods and identify areas for further development for spatiotemporal reconstruction of single-cell genomics data.

Biography

Dr. Qing Nie is a Distinguished Professor of Mathematics and Developmental and Cell Biology with an affiliated appointment in Department of Biomedical Engineering at University of California, Irvine. In research, Dr. Nie uses multiscale modeling and data-driven methods to study complex biological systems with focuses on single-cell analysis, cellular plasticity, stem cells, embryonic development, and their applications to regeneration, aging, and diseases. Dr. Nie has published more than 220 research articles. In training, Dr. Nie has supervised nearly 60 postdoctoral fellows and PhD students, with many of them working in academic institutions. Dr. Nie is a fellow of the American Association for the Advancement of Science, a fellow of American Physical Society, a fellow of Society for Industrial and Applied Mathematics, and a fellow of American Mathematical Society.

