Data Science Seminar

Hosted by the Department of Mathematics and Statistics

- Date: Tuesday, February 10, 2026
- Time: 12:15pm – 1:15pm
- Room: Whitney Hall 100E
- Speaker: Dr. Yizeng Li (Department of Biomedical Engineering at Binghamton University)
- Title: Multiphase Continuum Models for Cell Migration.

Abstract

Cell migration is a fundamental process in physiology and disease, yet it poses challenging problems in multiscale modeling and continuum mechanics. Cell motility arises from the coupling of intracellular transport, active force generation, and evolving geometry. Cytoskeletal dynamics, in particular actin turnover and force production, provides a rich setting for mathematical analysis. In this talk, I will present a mathematical framework for mammalian cell motility based on multiphase continuum models with moving boundaries. The formulation incorporates fluid-structure interaction and active stresses to describe the coupled evolution of cytoskeletal flow and cell shape. The model predicts how migration efficiency depends on actin dynamics and geometric features of the cell. If time permits, I will also present a mechanical-electrical-chemical coupled model for water-driven cell motility induced by polarized membrane ion transport. This second framework highlights how transport processes and force balance together generate directed motion.

Biography of the speaker: Yizeng Li is an Assistant Professor in the Department of Biomedical Engineering at Binghamton University. She received MS from Mathematics and PhD from the Department of Mechanical Engineering at the University of Michigan-Ann Arbor. Afterwards, she was a postdoctoral researcher at Johns Hopkins University's Department of Mechanical Engineering and Institute for NanoBioTechnology. Her backgrounds are in theoretical mechanics and applied mathematics with applications to biophysics and mechanobiology. Li develops physiology-based mathematical models for cell motility, polarization, volume regulation, electro-homeostasis, signal transduction, and other biophysics problems. She also combines mathematical models with experimental data to explain non-intuitive cell biology phenomena.