

ACMS Applied Math Seminar



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Thursday, September 26, 2024

154 Hurley Hall

3:30 PM – 4:30 PM

Discovering Biological Insights by Utilizing Mathematical Models for Spatially Heterogeneous Cellular Environments

Cells are naturally varied in how substances are spread within them, and this uneven distribution is important for many cellular functions, such as the body's circadian rhythm, protein movement, and chemical reactions. However, many mathematical models, particularly ordinary differential equations (ODEs), often simplify this spatial complexity. While incorporating spatial variation can enhance model accuracy, it also increases computational complexity. In this seminar, we will address this challenge by introducing novel mathematical approaches to represent better and analyze the heterogeneous intracellular environment. We will employ partial differential equations (PDEs) and agent-based models to capture spatiotemporal variations, incorporating different levels of stochasticity. Finally, to mitigate computational challenges, we will introduce a quasi-steady state approximation for PDEs, delineating specific conditions for their applicability.

The Department of Applied and Computational
Mathematics and Statistics

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