COLLOQUIUM

DEPARTMENT OF MATHEMATICS AND STATISTICS
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The Building Blocks of Life: Modeling Biochemical Reaction Systems

Abstract

In recent years, researchers have been granted an unprecedented window into the inner workings of such cellular processes as the circadian rhythm, the cell cycle, apoptosis (cell death), and metabolism. These biochemical systems, however, can have dozens of components interacting over hundreds of reaction channels, which presents several significant challenges for mathematical modelers: (1) the high dimension of the state space, (2) the non-linearities of the interaction kinetics, and (3) the typically unknown rate parameters.

In this talk, I will introduce the background for both the ordinary differential equation (deterministic) and continuous-time Markov chain (stochastic) modeling frameworks for biochemical reaction systems. I will briefly introduce some historical work from chemical reaction network theory which cuts through the complexity of these systems by connecting the topological structure of the interaction network to the dynamical system's behavior. Recent results on steady states, discrete extinction events, and computational methods will be presented.

Tuesday, Oct 1, 2019
12:00 – 12:50 P.M.
372 Mathematics and Science Center (MSC)

(Refreshments at 11:30-12:00 PM in the kitchen area adjacent to 368 MSC)