

Mathematical Methods in Biology

Abstract

Motivated by a range of biological problems we introduce methods from stochastic modeling—in particular Markov processes—, and transport equations on networks or complex geometries. By inspecting the solutions of these problems the participants will gain insight into classifying solutions of non-linear models, the impact of different types of noise on the solutions, and the limitations of continuum descriptions.

Preliminary Schedule

1	Nov 15	Introduction
2	Nov 17	From Molecular Motors to Stochastic Thermodynamics
3	Nov 22	Stochastic Thermodynamics
4	Nov 24	Fluctuation- and Work-Relations
5	Nov 29	From Poiseuille Flow to Circulation in Networks
6	Dec 1	Plant Leaves: Optimization vs Robustness
7	Dec 6	Caveats in Fluid Transport: Cavitation, Turbulence, ...
8	Dec 8	..., Boundary Conditions
9	Dec 13	Genes: Evolution and Shot Noise
10	Dec 15	Ecology: Populations, Chaos, Long Transients, Extinction
Exam/ Symposium	Dec 20	

All lectures will be take place from 14:00 – 17:00