Stochastic Processes Arising in Environmental Sciences

Organizer and Chair: Barbara Szyszkowicz (Carleton University)

DON DAWSON, Carleton University
Some Probabilistic Objects Motivated by Evolutionary Biology and Ecology

We investigate the roles of rare mutations and spatial migration in the emergence and spatial distribution of new types in evolutionary theory in the framework of a class of spatially structured stochastic population models which incorporate the effects of migration, selection and mutation. The objective is to investigate the evolution of the system in a hierarchy of space and time scales and to describe the emergence and spatial distribution of selectively advantageous mutants. The basic tool is a class of set-valued processes which provides a dual representation of the system of interacting Fleming-Viot processes. (Joint work with Andreas Greven.)

GAIL IVANOFF, University of Ottawa
Renewal Processes in Two Dimensions

We define a renewal property for point processes in two dimensions and show that the law of the renewal process is determined by a so-called avoidance probability function. The avoidance probability is the two-dimensional analogue of the survival function of the interarrival distribution of a renewal process in one dimension. We introduce nonparametric methods for estimation of the avoidance probability. We see that martingale methods yield a unified approach for renewal processes in both one and two dimensions, and can be used for both synchronous and asynchronous data. This talk is based partially on joint work with Katherine Davies.

REG KULPERGER, University of Western Ontario
Trend Analysis of Water Yields in Northern Catchments

Determining catchment responses to climate signals gives insight into the potential effects of climate change. This talk describes methods used to study the water yield over time from four headwater catchments in the Turkey Lakes Watershed in northern Ontario. The relatively simple statistical ideas of regression are used to remove signals thereby yielding some of the more interesting and subtler features which are ecologically interesting. This first analysis is based on annual data. Daily data are needed to study shorter lag effects, in terms of days or weeks.