University of Brno

Seminar and mini-course by Carlos A. Braumann

Seminar (1 hour):
Some applications of stochastic differential equations on biological phenomena

Abstract:
We will consider a randomly varying environment and will model the growth of a population living there as a stochastic differential equation. We generalize results previously obtained for specific average growth functions and consider also applications to fisheries. We will then consider models for the individual organisms, from birth to maturity, in a random environment and talk about applications in cattle breeding and forestry. We will discuss two important issues, namely the inadequacy of the regression models that have traditionally been used (we should say abused) and the issue of which calculus, Ito or Stratonovich, is more appropriate to model these phenomena (with a resolution to the controversy in the literature concerning this issue).

Mini-course on Stochastic Differential Equations and Applications (7-8 hours)

Abstract:
In order to model dynamical phenomena occurring in an environment subjected to random fluctuations, stochastic differential equations have been used very successfully in many areas of Science and Technology. The course gives an introduction to stochastic differential equations and emphasizes:
a) some biological applications, particularly to the growth of populations or of individuals living in a randomly varying environment and to fishery modelling;
b) financial applications (stock market and options, with the classic Black-Scholes model and Black-Scholes formula explained).