Fall 2019

MATH 605: Topics in Probability (39788R)

Numerical Methods in Stochastic Analysis

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We will discuss ideas and algorithms associated with numerical analysis of stochastic systems. To begin, we will survey the following topics:

(1) generating basic random variables, vectors, and processes;
(2) error analysis;
(3) sampling from the stationary distribution of an ergodic process;
(4) variance reduction methods;
(5) simulation of rare events;
(6) sensitivity analysis;
(7) stochastic optimization;
(8) numerical integration;
(9) simulation of Gaussian and Lévy processes;
(10) Markov Chain Monte Carlo methods;
(11) polynomial chaos method.

Then we will select a few particular topics, either directly from the above list or something related — depending on the interests of the participants, and discuss those topics in more detail.

Recommended text book: *Stochastic Simulation: Algorithms and Analysis* by Søren Asmussen and Peter W. Glynn, published by Springer in the series "Stochastic Modeling and Applied Probability", Number 57, 2007. The book is available on line through the USC library: do "quick search" for the title among "e-books" on the library web page http://www.usc.edu/libraries/.

Suggested preparation: math 502a and math 507a.