

2018 SoSe Stochastic Simulation

Institut für Mathematische Stochastik, Leibniz Universität Hannover

General Information

- Lecture | Dr. Sojung Kim
Tue/Fri 10.15 - 11.45, F428 (Begin: 10 April 2018)
- Exercise | M.Sc. Marcel Kleiber
Mon 08.15 - 09.45, F428 (Begin: 16 April 2018)
- Main textbook | P. Glasserman, Monte Carlo Methods in Financial Engineering, 2004.

Course Topics

This course offers an in-depth treatment of stochastic simulation and Monte Carlo methods for stochastic structures arising from financial mathematics. The course emphasizes theoretical analysis of stochastic numerical methods and their computational efficiency. The first parts of the course introduce fundamental notions in stochastic processes and calculus. These studies in turn provide the basis for developing stochastic numerical methods to be dealt with for the second parts. Real world examples and applications will be then considered. For prerequisites, students should have a general understanding of probability, statistics and stochastic processes, as well as some programming language (e.g. MATLAB, C).

Course work will include regular homework assignments and an exam. An exam consists of two parts: one group presentation with paper implementation and an individual final exam. Every homework assignment will involve at least one computer implementation of methods discussed in class. Use of MATLAB for computer work is encouraged but not required. For computer implementation, you will be required to submit your analysis of the results as well as a pseudo-code.

The following topics are to be covered:

- General sampling method and principles of Monte Carlo method
- Simulation of stochastic processes
- Statistical and computational efficiency analysis
- Variance reduction techniques
- Stochastic optimization
- Advanced topics by recent papers

Literature

- S. Asmussen, P. W. Glynn, Stochastic Simulation, Algorithms and Analysis, 2007.
- H. J. Kushner, G. G. Yin, Stochastic approximation algorithms and applications, 2003.

Dr. Sojung Kim

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