IE 58D Efficient Monte Carlo Simulation   Instructor: Wolfgang Hörmann

Objective: Ability to understand code and use efficient Monte-Carlo simulation algorithms; special emphasis will be laid on the development of variance reduction techniques for Monte Carlo algorithms. The examples in the course will be taken from option pricing and disease spread modelling.

It is possible to include examples in other application areas of Monte Carlo Simulation suggested by the students!

Prerequisite: A good knowledge of probability and simulation and some experience with programming (especially with R).

Tentative Course Outline:

Week 1+2:basics of simulation and R.

Week 3: Option pricing by Monte Carlo methods

Week 4: Basic variance reduction techniques (common ranom numbers, Antithetic variates).

Week 5-6: Variance reduction using control variates

Week 7-8: Variance reduction using importance sampling

Week 8-9: Conditional Monte Carlo

Week 10-13: Final Project

Lecture Notes: Effcent Monte Carlo for Option Pricing

Reference Books:

Christiane Lemieux: Monte Carlo and Quasi-Monte Carlo Sampling

Hörmann, Leydold, Derflinger: Automatic non-unifrom random variate Generation

Grading: Quizzes and Coding HW (30%), Final (30%). Final Project (40%).