QF 5237

Applications of Monte Carlo Methods on Financial Engineering

（蒙地卡羅方法於金融工程之應用）

This course introduces Monte Carlo methods to solve computational problems arising from modern finance. The mathematics behind Monte Carlo methods and finance are reviewed. The course contents include:

(1) Review: Elementary Probability Theory
(2) Basic Monte Carlo Method, GPU computing
(3) Simulation of Stochastic Processes; Ito's Calculus
(4) Black-Scholes-Merton Theory of Derivatives Pricing and Hedging
(5) American Options Pricing: Least Squares and Dual Methods
(6) Pricing Exotic Options
(7) Randomized Quasi-Monte Carlo
(8) Variance Reduction: Control Variate
(9) Variance Reduction: Importance Sampling
(10) Greeks Computation
(11) Some Generalizations

Grading: Assignments 40%, Course Project 30%, Exams(midterm and final) 30%.

Course Schedule: see course website.

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Class Hours: T 2-4
Classroom Location: 台積館 204

Textbooks:

1. 韓傳祥, "金融隨機計算," 新陸書局, 2012.
2. P. Glasserman, Monte Carlo Methods for Financial Engineering, Springer-Verlag, New York, 2003.
3. P. Jackel, "Monte Carlo Methods in Finance," John Wiley & Sons Ltd. 2002.

References:

1. C. Lemieux, Monte Carlo and Quasi-Monte Carlo Sampling. Springer, 2009.
2. H. T. Huynh, V. S. Lai, and I. Soumare, Stochastic Simulation and Applications in Finance with Matlab Programs.Wiely, 2008.
3. J. A. Bucklew, Introduction to Rare Event Simulation. Springer, 2004.