Monte Carlo Simulations in finance - MathLab

ECTS : 0

Description du contenu de l'enseignement :

Lecture 1 and 2: Introduction to MATLAB. Tutorial with numerical optimization of Rosenbrock's function and simulation of the Brownien Motion. Markowitz portfolio optimization.

Lecture 3: Binomial options pricing model. European, American, Butterfly and Barrier Knock - Out options. Simulation of a Binomial tree and assets trajectories.

Lecture 4: Black and Scholes Model. Monte-Carlo method for option valuation. European option. Correlated Brownian motions. Basket et Exchange options.

Lecture 5: Black and Scholes Model. Strongly Path-dependent options. Asian option. Lookback and Choosers. Stochastic volatility models. Euler-Maruyama approximation of Stochastic Differential Equations. Option and asset pricing in the Heston model.

Lecture 6 and 7: Merton Model. Poisson distribution. Simulation of assets trajectories with jumps. Option pricing in the Merton model.

Compétence à acquérir :

The students will learn important principles of implementation of financial models and master algorithms of evaluation of different types of derivative securities: European, American, standard, barrier and path dependent options on stocks.This course gives a comprehensive introduction to Monte Carlo and finite difference methods for pricing financial derivatives. At the end of the course, the student should have a thorough understanding of the theory behind Monte Carlo methods, be able to implement them for a range of applications, and have an appreciation of some of the current research areas.

Mode de contrôle des connaissances :

Control of Knowledge: Defense of a Project.

Bibliographie, lectures recommandées :

Reading List: 1) S E Shreve, Stochastic Calculus for Finance II: Continuous-Time Models, Springer 2004. 2) P Glasserman, Monte Carlo Methods in Financial Engineering, Springer-Verlag, 2004. 3) P Wilmott, S D Howison and J Dewynne, Mathematics of Financial Derivatives, CUP, 1995.