

PROBABILISTICS METHODS IN FINANCE



Composante
UFR de
mathématiques
et
informatique
(UFR27)



Volume
horaire
42h



Période de
l'année
Printemps

plugin.odf:CONTENT_PROGRAM_TABO1_TITLE

Chapter V. Option pricing in continuous time: Black-Scholes model

Description

Objectifs : Option pricing in discrete and continuous time, with martingales use and first steps of stochastic calculus.

Contenu du cours :

Chapter I. Preliminaries

1. Derivative products, description and use: Forward/Future contracts, Options

2. Rates and discounting

3. Arbitrage methods

Chapter II. Forward contracts pricing (reminder, in tutorial)

Chapter III. Mathematical tools

1. Conditional expectation, martingale.

Chapter IV. Option pricing in discrete time

1. N periods binomial model (Cox-Ross-Rubinstein); self-financing strategies,

2. risk-neutral probability, martingale property of the discounted price process,

3. option pricing, delta hedging.

1. Brownian motion and Ito processes.

2. Quadratic variation of the Brownian motion,

3. Ito integral for a simple process,

4. Extension to the computation of $\int_0^t B_s dB_s$,

5. Ito lemma (heuristic proof).

6. Black-Scholes model

7. Partial differential equation approach, hedging from that equation.

8. Probabilistic approach for European options,

9. Girsanov theorem (particular case),

10. Black Scholes formula, delta computation, use.

Références :

* Hull, *Options, futures, and other derivative securities*, Prentice-Hall (2018: 10th ed).

* Baxter, M. and Rennie, A., Cambridge University Press, 1996.

* Kwok, Y.K., *Mathematical models of financial derivatives*, Springer, 2nd edition, 2008 (3 first chapters).

* Jacod, J., Protter, P. (2000) *Probability Essentials*. Springer.