

UNIVERSITY OF CRAIOVA
Faculty of Mathematics and Natural Sciences
Department of mathematics
Fundamental domain : Mathematics
Specialization: Master - Applied mathematics
Education form: full time
Duration of studies : 2 years
Academic year : 2013-2014

Subject : *Financial mathematics*

Code: D4MMAM317

Instructor : Lect.dr. Monica Roşiu

Number of credits : 6

Year/Semester : Year II, Semester 1

Number of hours/week : 2 Classes + 2 Seminar classes

Number of weeks : 14

Type discipline: Fundamental

Objectives: The aim of the course is to equip our students with a solid foundation in mathematics and in doing so provide them with practical knowledge that they can successfully apply to complicated financial models. The course develop derivative securities valuation, portfolio structuring, risk management and scenario simulation through the binomial pricing model and arbitrage pricing theory

Content :

C₁ : Financial markets and derivative securities. No-arbitrage condition. Call options. Put options. Forward contracts. Examples

C₂ : No arbitrage price of an option for the binomial model. Delta-hedging formula. Example

C₃: First Fundamental Theorem of Asset Pricing for a multiperiod , finite state model. Example

C₄: Computational considerations. Examples

C₅: Probability theory and discrete-time stochastic processes. Distributions. Random variables. Examples

C₆: Risk-neutral measure and option pricing . Expectation, information, and σ -algebras. Jensen's inequality . Exemple

C₇: Conditional expectations. Fundamental properties. Exemples

C₈: Martingales. The discounted stock price. The discounted wealth process

C₉: Risk-neutral pricing formula. Cash flow valuation

C₁₀: Markov Processes. Lemma of independence. Exemples: Stock price, Non –Markov process

C₁₁: Change of measure. Radon-Nikodým derivative process

C₁₂: State price density. Optimal investment.Examples

C₁₃: Derivatives securities. Non-path- dependent derivatives. Stopping times. The Optional Sampling Theorem

C₁₄: Random walk. First Passage Times. Reflection Principle. Example

Bibliography :

1. K.Back, *A Course in Derivative Securities: Introduction to Theory and Computation*, Springer, 2005
2. M.Baxter and A. Rennie, *Financial Calculus: An Introduction to Option Pricing*, Cambridge, 1996

3. J.C.Hull, *Options, Futures, and other Derivatives*, 6th Edition, Prentice Hall, 2006
4. P.Hunt and J.Kennedy, *Financial Derivatives in Theory and Practice*, Wiley, 2004
5. S.R.Pliska, *Introduction to Mathematical Finance: Discrete Time Models*, Blackwell, 1997
6. S.E.Shreve, *Stochastic calculus and Finance I: Binomial Model*, Springer, 2004
7. P.Wilmott, *Paul Wilmott on Quantitative Finance*, 2nd edition, Wiley, 2006

Working language : Romanian

Evaluation : Colloquy

Evaluation mode : Written exam