UNIVERSITÀ DI PAVIA

Anno Accademico 2016/2017

QUANTITATIVE FINANCE

Enrollment year	2016/2017
Academic year	2016/2017
Regulations	DM270
Academic discipline	SECS-P/01 (POLITICAL ECONOMY)
Department	DEPARTMENT OF ECONOMICS AND MANAGEMENT
Course	ECONOMICS, FINANCE AND INTERNATIONAL INTEGRATION
Curriculum	Finance
Year of study	1°
Period	2nd semester (20/02/2017 - 20/05/2017)
ECTS	9
Lesson hours	66 lesson hours
Language	ENGLISH
Activity type	WRITTEN AND ORAL TEST
Teacher	DE GIULI MARIA ELENA (titolare) - 9 ECTS
Prerequisites	No specific prerequisite is needed. Nonetheless, familiarity with the basic concepts of Calcus, Probability and Statistics will be helpful.
Learning outcomes	This is a course in the applied aspects of mathematical finance,in particular derivative pricing. The theory of stochastic differential equation is the main mathematical tool used in this course. We cover the basic Black-Scholes-Merton theory and we extend it to the case of several underlying assets (including stochastic interest rate) as well as to dividend paying assets. Interest rate theory constitues a substantial part of the course. It is expected the learning of the basic elements of quantitative finance to understand how financial markets work and how complex financial instruments can be assessed. Following a practical risk management approach to derivatives, various exercises will be discussed. MATLAB tools will be used for the computational work.
Course contents	- Option markets and contracts: basic definitions and illustrations of

	option contracts, types of options (financial options, options on futures, commodity options, other types of options) - Discrete time option pricing: the Binomial Model - Stochastic calculus (Itô integral, martingales, Itô formula) - Stochastic Differential Equations (Geometric Brownian Motion, the Kolmogorov equations (backward and forward) - Continuous time option pricing: the Black-Scholes-Merton formula, Inputs to the Black-Scholes-Merton model, the critical role of volatility (historic and implied volatility) - Risk management application of option strategies - Option strategies for equity portfolios: standard long and short positions, risk management strategies with options and the underlying, money spreads, combinations of calls and puts - Interest rate option strategies - Option portfolio risk management strategies: Delta hedging an option over time, Gamma and the risk of Delta, Vega and volatility risk - Some aspects of derivative pricing in incomplete markets - Forward markets: types of forwards contracts, pricing and valuation - Futures markets: types of futures contracts, pricing and valuation - Swap markets: types of swaps, pricing and valuation - Bond and interest rates - Short rate models; martingale models for the short rate, forward rate models
Teaching methods	Theoretical lectures and laboratory with MATLAB, Seminars, Mid-term assessment
Reccomended or required readings	T. Bjork, Arbitrage Theory in Continuous Time, 3rd ed., Oxford University Press, 2009 Don M. Chance, Analysis of Derivatives for the CFA® Program, AIMR, United Book Press Inc., 2003
Assessment methods	Written exam.
Further information	The course material as well as further information are available at http://elearning1.unipv.it/economia/
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile