General Information	
Academic subject	Mathematical Finance
Degree course	Economics of Financial Markets and Institutions
Curriculum	
ECTS credits	8
Compulsory attendance	No
Language	Italiano

Subject teacher	Name Surname	Mail address	SSD
	Antonio Attalienti	antonio.attalienti@uniba.it	SECS-S06

ECTS credits details			
Basic teaching activities			

Class schedule	
Period	Second Semester
Year	Second
Type of class	Lectures

Time management	
Hours	56
Hours of lectures	42
Tutorials and lab	14

Academic calendar	
Class begins	18/02/2019
Class ends	07/06/2019

Syllabus	
Prerequisites/requirements	Differential calculus in more variables, integral calculus, basic concepts in probability and financial mathematics
Expected learning outcomes	Knowledge of the basic concepts in Probability and Stochastic Processes Theory; Knowledge of the structure of the main contingent claims and their non-arbitrage boundaries; Knowledge of the main techniques of option pricing in both discrete and continuous settings.
Contents	•
Course program	**Probability Background:** Probability spaces. Independence. Random variables and related distribution functions. Special distributions and their property. Functions of random variables. Expected value, variance, covariance and main properties. Weak and strong law of great numbers. Central limit theorem. **Stochastic processes:** Introduction to stochastic processes. Brownian motion, geometric Brownian motion and related topics. Martingales. Riemann-Stiltjes' integral. Ito's integral and

	Ito's formula. Basics on stochastic differential equations. **Derivative Instruments:** Financial markets and derivatives. Arbitrage. Risk-neutral valuation. Options and main properties. Arbitrage bounds. Put – call parity formula. **Pricing option theory:** Black-Scholes model. The Black – Scholes option pricing equation and the corresponding formula. The Greeks. Binomial model by Cox-Ross-Rubinstein for European and American options and related topics. Calibration of the parameters. Convergence of the binomial model formula towards the Black-Scholes formula. Pricing and Hedging with Monte Carlo Methods.
Bibliography	1) Agliardi E., Agliardi R., *Mercati finanziari, Analisi Stocastica delle Opzioni*, McGraw-Hill, 2001. 2) Benth F. E., *Option Theory with Stochastic Analysis*, Springer 2004. 3) Bingham N.H., Kiesel R, *Risk – Neutral Valuation*, Springer 2004. 4) Björk T., *Arbitrage theory in continuous time*, Oxford University Press, 2004. 5) Canestrelli E., Nardelli C., *Modelli per la Finanza Quantitativa*, Giappichelli Editore (Torino), 2003. 6) Higham Desmond J., *Introduction to Financial Option Valuation: Mathematics, Stochastics and Computation*, Cambridge University Press, 2004. 7) Hull J. C., *Opzioni, Futures e altri Derivati*, Pearson Prentice Hall, 2018. 8) Kwok, Y. K., *Mathematical Models of Financial Derivatives*, Springer Berlin Heidelberg 2008. 9) Sheldon M. Ross, *An elementary introduction to Mathematical Finance*, Cambridge Uni. Press, 2011. 10) Whaley Robert E., *Derivatives: Markets, Valuation and Risk Management*, Wiley Finance, 2006. 11) Williams D., Probability with Martingales, Cambridge University Press, 1991. 12) Wilmott P., Howison S. and Dewynne J., *The Mathematics of Financial Derivatives*, Cambridge University Press, 1995.
Notes	
Teaching methods	Lectures and tutorials
Assessment methods	Oral
Evaluation criteria	Learning the main techniques for pricing derivatives both in discrete and continuous setting
Further information	