UNIVERSITÀ DEGLI STUDI DI PALERMO

DIPARTIMENTO	Scienze Economiche, Aziendali e Statistiche (SEAS)
SCUOLA	SCUOLA POLITECNICA
ANNO ACCADEMICO OFFERTA	2015/2016
ANNO ACCADEMICO EROGAZIONE	2016/2017
CORSO DILAUREA MAGISTRALE	SCIENZE ECONOMICHE E FINANZIARIE
INSEGNAMENTO	PROBABILITY AND STOCHASTIC PROCESSES
TIPO DI ATTIVITA'	C
AMBITO	20979-Attività formative affini o integrative
CODICE INSEGNAMENTO	15969
SETTORI SCIENTIFICO-DISCIPLINARI	SECS-S/01
DOCENTE RESPONSABILE	ADELFIO GIADA Professore Associato Univ. di PALERMO
ALTRI DOCENTI	
CFU	6
NUMERO DI ORE RISERVATE ALLO STUDIO PERSONALE	108
NUMERO DI ORE RISERVATE ALLA DIDATTICA ASSISTITA	42
PROPEDEUTICITA'	
MUTUAZIONI	
ANNO DI CORSO	2
PERIODO DELLE LEZIONI	1° semestre
MODALITA' DI FREQUENZA	Facoltativa
TIPO DI VALUTAZIONE	Voto in trentesimi
ORARIO DI RICEVIMENTO DEGLI STUDENTI	**ADELFIO GIADA** Martedì 11:00 13:00 ex DSSM secondo piano Giovedì 11:00 13:00 ex DSSM secondo piano

DOCENTE: Prof.ssa GIADA ADELFIO

PREREQUISITI	
RISULTATI DI APPRENDIMENTO ATTESI	Knowledge and understanding At the end of the course, students should show knowledge and comprehension: -of probability theory and measure theory; -of several types of convergence of random sequences. -of the definition of a stochastic process (S.P.) -of classification of S.P. -of Random walk and the Gambler's ruin problem; -of discrete Markov chains and theory of state classification -of time continuous S.P.; -of continuous Markov chains and queues; -of Martingales, strategies and stopping time; -of Point Processes, Renewal process; Applying knowledge and understanding Students should become able to apply their knowledge and comprehension to tackle problems of uncertainty by means of suitable stochastic models. Specifically, students should be capable to: -classify a stochastic process; -interpret different forms of stochastic dependencies; -describe a time and space dependent random process with a suitable stochastic process; Making judgments: Students should become able to recognize the significant elements of a problem of uncertainty, thereby assessing the probabilistic tools used to tackle the problem. Communication skills: Ability to explain the characteristics of probabilistic tools, highlighting the usefulness of their application Learning skills: Ability to read the national and international basic literature, and increase the acquired knowledge in attending higher level courses
VALUTAZIONE DELL'APPRENDIMENTO	Prova orale
OBIETTIVI FORMATIVI	Course objectives The course aims to provide a basic probabilistic preparation with the introduction of some useful concepts for the advanced use of probability theory and stochastic processes in discrete and continuous parameter, focusing on some of the most frequently exploited models in applied sciences.
ORGANIZZAZIONE DELLA DIDATTICA	42 (30 lezione frontale + 12 esercitazione/lab.)
TESTI CONSIGLIATI	S. Ross (2008) Introduction to probability models, Academic Press. G. R. Grimmett, D. R. Stirzaker (2001). Probability and Random Processes (Third Edition). Oxford University Press. G., Dall'Aglio (2001) Calcolo delle probabilità, Zanichelli. L. Daboni, Calcolo delle Probabilità ed Elementi di Statistica, , Utet; W. Feller. An Introduction to Probability Theory and Its Applications, Vol. 1, Wiley Series

PROGRAMMA

ORE	Lezioni
2	Probability measure and basic rules - Conditional Probability Bayes-theorem
2	Random variable - Independent Random variable - Probability density function – Joint distribution - Joint and marginal densities -Moment of a random variable - Covariance and correlation - Random vectors Discrete distribution Continuous distributions
2	Conditional expectation - Conditional distribution - Properties of Conditional expectation
2	Expectation of random number of r.v.'s . Inequalities Asymptotic theory: Convergences Examples of convergence in probability and a.s. Law of large numbers Central limit theorem
4	Predictable stochastic processes - Stationary Processes Discrete time processes. Definition of Markovian process, and discrete time Markov chai (DTMC). Stochastic matrix and its properties. Chapman-Kolmogorov equation.
2	State classification, class properties and irreducibility, Absorbing Markov chain Canonical Form Fundamental Matrix
2	Martingales introduction and Fair game Doob decomposition of an adapted process . Stopping times Theorem of convergence of martingales
2	Gambler's ruin problem Applications Risk insurance business, Random walk hitting probabilities

PROGRAMMA

ORE	Lezioni
4	Continuous-time stochastic processes -Markov processes Birth-death process Queue model - Time Homogeneity (Embedded Markov Chains) The Transition Probability Function Backward and Forward Equations The Infinitesimal Generator: Stationary Distributions for CTMC
2	Gaussian noise The Wiener process / Brownian motion - Markov property of Brownian motion . Brownian motion drift and scaling
2	Ito calculus - Renewal process, Point process and Moments - K function
4	Conditional intensity functions, Papangelou, Probability generating functional, compensator, Homogeneous Poisson -Operations on PP (thinning, superposition,..) More general Processes - Marked PP, ETAS, ML estimation

ORE	Esercitazioni
2	Probability measure and basic rules - Conditional Probability Bayes-theorem
4	Moments of a random variable - Conditional expectation - Conditional distribution -
2	Markov chains and State classification Markov Chains
2	Martingales and Fair game . Examples of Martingales
2	Renewal process, Point processes