

The Stochastic Processes and their Applications to biology

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Calendario: 20 ore, Lunedì e Venerdì ore 9.00 - 11.00. Prima lezione 21 maggio 2010. Torre Archimede, Aula 2BC/30.

Prerequisiti: nozioni di base di Calcolo delle Probabilità (utili, ma non necessarie)

Tipologia di esame: colloquio orale.

SSD: MAT/06

Programma del corso:

A. THEORY

1. Brief Review of Probability Theory
2. Some Facts from Matrix Theory
3. Discrete Time Markov Chains
4. Brownian Motion and Diffusion Processes
5. Ito Stochastic Integral and Stochastic Chain Rule (Ito Formula)
6. Stochastic Differential Equations
7. Poisson Processes

B. APPLICATIONS

1. Biological Applications of Discrete Time Markov Chains:
 - (a) general birth and death process
 - (b) stochastic SIS epidemic models
 - (c) chain binomial epidemic models
 - (d) logistic growth process
 - (e) genetic inbreeding problem
2. Biological Applications of Stochastic Differential Equations (SDE):
 - (a) Ito SDEs for linear growth models
 - (b) Ito SDEs for interacting populations
 - (c) Ito SDEs for logistic growth process with environmental variations
 - (d) Ito SDEs for stochastic population genetics models