



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Processi Stocastici M

2526-1-F8206B021

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#### Learning objectives

The aim of the course is to introduce the main concepts concerning some classes of stochastic processes of particular methodological and applied relevance.

The student is expected to learn the fundamental properties of some important classes of stochastic processes and to be able to formalize relevant problems connected to real phenomena described by such processes. In addition she/he should be able to derive the quantities needed to solve these problems.

The course, by introducing some important classes of stochastic processes, contributes to achieve the educational objectives of the area "Statistics" of the degree program.

#### Contents

General definition of stochastic process

Markovian processes

Poisson process and Brownian motion

Point processes

Spatial processes

#### Detailed program

Introduction to the theory of stochastic processes

Discrete time Markov chains:

- Chapman-Kolmogorov equations
- Classification of states
- Limit results.

Brief introduction to continuous time Markov chains.

Brownian motion

Poisson process

Point processes

Spatial processes:

- stationarity and isotropy
- variogram and covariogram
- main isotropic models.

## **Prerequisites**

Knowledge of probability theory as taught in the course "Probabilità applicata".

The course is not suitable for undergraduate students enrolled in the Erasmus Program. Erasmus postgraduate students are invited to contact the teacher at the beginning of the course.

## **Teaching methods**

The course is taught in Italian through class lectures and exercises and is held in person.

Lectures are aimed at understanding concepts relative to the taught subjects, giving particular attention to the intuitive interpretation, the applicative potential and the mathematical formalization.

## **Assessment methods**

Final oral exam on the subjects taught in the course.  
There are no tests during the course.

The final oral exam is aimed at verifying the understanding of concepts and fundamental properties of the

considered stochastic processes and the capacity of using these concepts and properties to appropriately and critically deal with practical problems. Evaluation of the student communicative ability is an objective of the exam as well.

## **Textbooks and Reading Materials**

Ross S., Probability models, Academic Press, 2003.

Durrett R., Essentials of stochastic processes, Springer, 1999.

Notes on spatial processes are available on the web-site of the course.

## **Semester**

Second term (six weeks) of the first semester.

## **Teaching language**

Italian

## **Sustainable Development Goals**

QUALITY EDUCATION

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