UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

# Computational Statistics

**2627-3-E4101B041**

## Learning objectives

The aim of the course is to illustrate some computational statistical tools which are fundamental for data analysis and modeling.
The course contributes to the achievement of the educational objectives in the learning area of the degree program: "Statistics". In particular, it provides the knowledge and skills to identify and implement appropriate statistical-probabilistic models and to draw suitable inferential conclusions with the support of computational techniques.

## Contents

Mixture-based clustering , classification and regression methods.

## Detailed program

Mixture models. Model-based clustering. Model-based classification. Mixture of experts models. Data visualization and manipulation (tidyverse).

## Prerequisites

Knowledge of the notions given in the courses "Multivariate Statistics" and "Statistics III" is recommended.

## Teaching methods

Class lectures and lab sessions. The classroom lectures are aimed at deepening the student's theoretical knowledge of the course topics and their formalization.
The computer lab sessions focus on the implementation of models on real and simulated data using the R software.
The lectures will be held in person.

## Assessment methods

The exam consists of:

- A final project work (group-based) to be submitted at least 4 working days before the exam date.
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- A written exam in the computer lab (exercises using R and theoretical questions on the topics covered in class).

The exam is closed-notes and closed-book, but students are allowed to use the R scripts made available by the teacher.
No phones are allowed during the exam.

## Textbooks and Reading Materials

- Fruhwirth-Schnatter (2006) Finite mixture and Markov switching models
- McLahan-Peel (2000) Finite_Mixture_Models
- Kabacoff (2018) Data Visualization with R

Further material will be circulated via the e-learning page of the course.

## Semester

The course is scheduled in the second term (six weeks) of the first semester.

## Teaching language

Italian

## Sustainable Development Goals

QUALITY EDUCATION