UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# SYLLABUS DEL CORSO

## Statistical Learning M

**2122-2-F8204B015**

### Learning objectives

Statistical learning _____The course aims to introduce the main methods of Statistical Learning, discussing both the algorithms and the inferential aspects.

### Contents

_____

- high-dimensional regression
- variable selection with statistical guarantees
- conformal prediction

### Detailed program

- Prediction, Estimation, and Attribution.
- James-Stein estimation.

- Ridge regression.
- Splines.
- Additive models.

- Classical versus high-dimensional theory.

- Sparse Modeling and the Lasso.
- Best Subsets Selection.

- Data splitting for variable selection.

- Stability selection.

- Knockoff filter.

- Conformal prediction.

## Prerequisites

Knowledge of topics covered in the courses *Probability and Statistics M*, *Advanced Statistics M* and *Data Mining* (module of *Data Science M)* is highly recommended.

## Teaching methods

Lessons are taught in classroom and lab.

## Assessment methods

The exam consists in a ____

## Textbooks and Reading Materials

- Efron, Hastie (2016) *Computer-Age Statistical Inference: Algorithms, Evidence, and Data Science*. Cambridge University Press
- Hastie, Tibshirani, Friedman (2009). *The Elements of Statistical Learning.* Springer
- Hastie, Tibshirani, Wainwright (2015). Statistical Learning with Sparsity: The Lasso and Generalizations. CRC Press

- Lewis, Kane, Arnold (2019) *A Computational Approach to Statistical Learning*. Chapman And Hall/Crc.

- Shalizi (2021). Advanced Data Analysis from an Elementary Point of View.

- Wainwright (2019) *High-Dimensional Statistics: A Non-Asymptotic Viewpoint*. Cambridge University Press

## Semester

Second semester, first period.

## Teaching language

The lessons are held in Italian, textbooks are in English.