UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

## Statistics I - 2

**2021-1-E1803M041-T2**

### Learning objectives

Statistics is a collection of methods and tools designed with a view to support decision-making processes. Statistics is a way of thinking based on qualitative and quantitative data, and is crucial to economic and managerial decisions.

A priority of this course is to introduce students to the importance of statistical training for their professional future. This goal is pursued by addressing real-world problems that arise in economics, finance, and insurance.

Based on a mix of lectures, exercise sessions and online materials, the course provides students with statistical competences in view of:

- identifying which data are needed to address a problem or achieve a specific objective;
- organizing data into statistical tables and visualizing data with appropriate charts;
- getting the right information out of a dataset, making use of appropriate techniques;
- recognizing data structures in univariate and bivariate contexts.

### Contents

The course covers the following topics:

- data classification and exploratory data analysis (with charts and tables);
- descriptive statistics for univariate and bivariate data.

## Detailed program

*What is Statistics?*

- Statistics as a science
- Applications of Statistics
- The branches of Statistics

*Summarizing univariate data*

- Data collection
- Ratios of statistical data
- Frequency distributions and charts
- Location measures
- Variation in data: concept and measures
- Inequality: concept and measures
- Skewness
- Mathematical models for frequency distributions

*Summarizing bivariate data*

- Statistical interpolation
- The method of least squares
- Properties of least squares
- Bivariate frequency distributions
- Independence and association measures
- The regression function and the regression line
- Concordance and correlation measures

## Prerequisites

The course has no specific pre-requisites.

Only a basic knowledge of mathematical methods from Secondary School is presumed.

## Teaching methods

The course consists of lectures (5 ects = 40 hours) and exercise sessions (1 ects = 12 hours).

Lectures include a formal presentation of statistical methods (background, definitions, proofs), followed by simple numerical exercises in which methods are applied to concrete situations. Interpretation of results is crucial. Whenever possible, real-world applications in socio-economic and financial contexts are mentioned.

Exercise sessions guide students through the solution of more complex exercises, which require the ability to identify the appropriate methods and to combine different techniques.

In view of encouraging individual work, lecture notes are uploaded on the e-learning platform on a day-to-day basis and for a limited time period. The e-learning platform also contains a variety of course materials that are useful to prepare for the final exam:

- exercises with detailed solutions,
- online quizzes and self-assessment activities,
- exercises given in previous exams, with detailed solutions or summary results.

These methods might be updated in view of the evolving epidemiological situation.

## Assessment methods

Assessment methods aim at verifying that students:

1. have understood the logic behind different statistical methods and the properties of various statistical measures;

2. are familiar with statistical techniques in view of analyzing a univariate/bivariate dataset and reaching reliable conclusions;

3. are able to interpret the results of statistical analyses and to provide appropriate comments for the numbers they produce.

For items 2. and 3. assessment is based on a written exam, consisting of practical exercises based on univariate and bivariate statistical tables.

Students who are graded at least 18/30 in the written exam have access to an oral exam, in which their competences in item 1. are evaluated by a series of open questions.

The final grade is based on a global evaluation of competences that students have acquired in both aspects of the course (theory + practice).

## Textbooks and Reading Materials

- M. Zenga, "Lezioni di Statistica Descrittiva", second edition, Giappichelli ed.
- M. Zenga “Esercizi di statistica”, Ed. Giappichelli, 1993
- M. Zenga “Richiami di matematica”, Ed. Giappichelli, 1992
- G. Leti “Statistica descrittiva”, Ed. Il Mulino, 1983.
- Lecture notes avaliable on the e-learning platform.

Online activities (quizzes, assignments, self-assessment tools) are available on the e-learning platform to encourage and monitor the learning process.

## Semester

Spring

## Teaching language

Italian