UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

## Statistics I - 2

**2627-1-E1808M006-T2**

### Learning objectives

**1. Knowledge and Understanding**
The course provides students with a basic knowledge of descriptive statistics, emphasizing the critical role of data analysis in interpreting economic and financial phenomena. Core concepts, tools, and techniques are introduced, with constant reference to real-world applications in the banking, insurance, and financial intermediary sectors.

**2. Ability to Apply Knowledge and Understanding**
Students acquire the ability to apply statistical techniques to collect, organize, and present data effectively, supporting a data-informed approact to decision-making. Through lectures, practical exercises, and digital resources, they are guided in developing operational skills essential for addressing concrete problems in economic and financial contexts.

**3. Independent Judgment**
The course fosters the development of critical thinking in evaluating data quality and selecting appropriate analytical tools. Students learn to interpret analytical results with awareness and rigor, developing a data-driven approach to reasoning.

**4. Communication Skills**
The course promotes the ability to clearly communicate the results of statistical analyses, using appropriate language and effective visual tools. Students are encouraged to discuss and justify their analytical choices, even in collaborative contexts.

**5. Learning Skills**
The course encourages the development of autonomous learning strategies, which is essential for further exploration of quantitative disciplines. Teaching resources and practical activities support active and lasting learning, beneficial both for future studies and professional development.

## 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) that will be delivered in presence, with approximately 30-40% of interactive activities (Excel, Wooclap surveys, quizzes and online

exercises).

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. Computer-based solutions of statistical problems are introduced with Excel .

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.

Assessment is based on a written exam in computer lab, consisting of theoretical questions and practical exercises based on univariate and bivariate statistical tables with Excel. Depending on results of the written exam, an oral exam concerning the whole programme can be requested.

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, Excel files and videorecordings) are available on the e-learning platform to encourage and monitor the learning process.

## Semester

Spring

## Teaching language

Italian

## Sustainable Development Goals

QUALITY EDUCATION