# Statistics

## Professor Laura Barbieri

***COURSE AIMS AND LEARNING OUTCOMES***

The course introduces the students to the basic concepts and methods for statistical data analysis. The aim is to provide essential understanding of statistical techniques used to support modern business decision making and economic data modelling. The main data analysis tools will be presented, both from a descriptive and inferential perspective.

***Learning outcomes.*** At the end of the course students will be able to interpret the main results of the statistical analyses, with careful and critical awareness of potential errors and/or poor use of data. Students will also be able to use such tools independently, managing to identify the most suitable for each context, and to communicate the results of the analyzes with the appropriate technical terminology. The course provides a preparation for more advanced statistical techniques students will face during the rest of their degree course.

***COURSE CONTENT***

Part I: Descriptive statistics

*Introduction*. Tabulation and graphical representations. Histograms.

*Means.* Main Means and their properties. Median and Mode.

*Variability.* Variance and its properties. Coefficient of variation, absolute deviation from the median.

*Concentration.* Lorenz curve. Gini coefficient. Absolute Mean Difference.

*Bivariate descriptive statistics.* Covariance and its properties. Linear Correlation. Least Squares.

Part II: Probability theory

*Introduction*

*Theory of discrete random variables*

*Families of discrete random variables*

*Theory of continuous random variables*

*Notable families of continuous random variables*

*Discrete and continuous dual random variables*

Part III: Statistical inference

*Point estimate*

*Interval estimate*

*Hypothesis testing theory*

Part IV: Regression models

*Simple linear regression model*

***READING LIST***

S. Borra-A. Di Ciaccio, *Statistica. Metodologie per scienze economiche e sociali,* 4a ed., McGraw-Hill, Milano, 2021.

***TEACHING METHOD***

Lectures and assignments.

***ASSESSMENT METHOD***

The exam is aimed at assessing knowledge and analytical rigor on the topics covered by the course, as well as knowledge and correct use of the appropriate technical terminology. The exam consists of a written test including a theoretical part and a practical part. The theoretical part is worth 10 points and includes TRUE/FALSE answer questions. The practical part is worth 20 points and involves solving some exercises (the scores of the various exercises are indicated in the exam text). The theoretical questions are designed to test the student’s knowledge of the technical terminology and of the theoretical concepts. Furthermore, by solving the exercises, students are asked to demonstrate their ability to apply the analysis techniques to small data sets.

According to the decisions taken in this regard by the faculty, the written test can be passed by getting a positive result in two written exams: a first mid-term test in the (unique) date approved for this purpose by the faculty, and a second test in exam sessions immediately following the end of the course teaching period. The average marks obtained in intermediate examinations defines the written test grade.

***INSTRUCTIONS AND PREREQUISITES***

More detailed information on the course program, the parts of the recommended texts of specific interest for the course, bibliographical material and additional study, will be provided by the teacher during the lessons and in Blackboard.

As a basic course, teaching does not need any prerequisite for content. It is advisable to follow this course after following the course of *matematica generale* of the first year.

***NOTES***

Information on office hours available on the teacher's personal page at <http://docenti.unicatt.it/>.