# Applied Statistics (for the students of the Degree Course in Economics, Organization and Markets)

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***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

The aim of the course is to provide students with the fundamentals of probability and statistical inference for solving typical problems on data analysis in economics and business. The theoretical presentation will be supported by examples and real-world applications that will enable students to understand how to approach and solve inferential problems related to any decision-making process, along with the use of statistical software as Excel and R.

The following learning abilities are provided and expected to be achieved by participants at the end of the course:

1. Knowledge of concepts, terms and methods of statistical inference and of the main models and methods of the applied statistics;
2. Ability to correctly apply methods of statistical inference and probability to real economics and management problems;
3. Quantitative thinking addressed to make independent judgements, driven by rigorous reasoning and inferential statements;
4. Ability to read and interpret data and communicate results, through the extraction of qualitative information from quantitative data;
5. Mastery of tools useful for subsequent academic courses in the curriculum, as well as for quantitative analyses required in future careers involving management of data and data-driven decision-making.

***COURSE CONTENT***

*Overview of probability theory.* Definition of probability and basic theorems. Main probability models: uniform, binomial, normal, and related continuous random variables (Chi-squared; t-Student, F). Central limit theorem.

*Fundamentals of statistical inference.* The concept of representative sample. Probabilistic and non-probabilistic sampling procedures. Definition of parameter and sample statistics. Sampling distribution of the frequently-used statistics.

*Point and interval estimation.* Main properties of point estimators. Introduction to the most usual point estimation techniques. Interval estimate (confidence intervals). Confidence intervals for mean and percentage.

*Hypothesis testing.* General aspects of statistical tests. Main parametric tests for the mean based on the assumption of normality for one and two sample problems. One-way ANOVA test.

*Applications in economics and business.* Chi-square test for independence and goodness-of-fit. Inference in the multiple linear regression model: F and t-tests. Regression with dummy variables. Residual analysis. Logistic regression.

***READING LIST***

S. Borra-A. Di Ciaccio, *Statistica. Metodologie per le scienze economiche e sociali,* McGraw Hill, Milano, 2021 (4a ed.). [Gli argomenti del programma sono trattati nei capp. 10-14, 16-18, 20].

A similar English textbook can be suggested on demand.

***TEACHING METHOD***

Lectures and practical exercises.

***ASSESSMENT METHOD***

The assessment consists of a written exam, to complete in 90 minutes, made by 5 exercises with open-ended answers and 8 multiple choice theoretical questions.

Students attending class regularly have the possibility to take a midterm exam which accounts for 50% of the final score. Details will be posted on Blackboard. The second partial exam will take place together with the general exams.

Aim of the exam is to assess reasoning analytic abilities on the course subjects. Language properties and communication abilities are also assessed.

***NOTES AND PREREQUISITES***

 This course is provided in the first semester for the students of the Degree Course in Economics, Organization and Markets; it follows that the available exam dates are: 3 in the winter session, 1 in the summer session, 1 in the autumn session.

The course of Statistics (Data Analysis and Probability) provides the pre-requirements of the arguments introduced in the contents.

***OFFICE HOURS***

The teachers receive the students as reported on their personal web page and on the Blackboard page of the course.