# Social Statistics

## Prof. Giulia Rivellini

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

The course aims to provide students with introductory notions of descriptive (univariate and bivariate) and inferential statistics.

*Intended learning outcomes*

1) *Knowledge and understanding*

Students will be able to identify and understand measures of synthesis, association and linear dependence adequate to the analysis of a sample of statistical units or of a population. Students will be able to identify the appropriate statistical measures to compare a phenomenon observed within two distinct collectives. Students will know definitions, formulas and meaning of univariate and bivariate descriptive statistics indices. Students will be able to visualize the frequency distributions of various types of statistical variables and of direct and inverse linear dependence. Students will know the definitions and axioms of probability calculation, on which statistical inference is based; students will be able to extract and recognize a probabilistic sample and will be able to explain the meaning of a representative sample of a population. Students will then be able to interpret the results of a statistical test and evaluate whether the sample data support predefined research hypotheses. Students will demonstrate knowledge of the specific terminology of the subject.

2) *Ability to apply knowledge and understanding*

Students will understand how to approach the study of a social phenomenon using quantitative methods. Starting from a set of data, students will demonstrate to be able to synthesize the phenomenon through the calculation of adequate quantities. Students will be able to use the results of these analyses to answer questions regarding the topic the data refers to. If the data relates to a sample, students will be able to use the probability calculation tools to measure and control the uncertainty of the results observed. Students will be able to test if the sample data support research hypotheses. Students will demonstrate appropriate use of the specific terminology of the subject.

3) *Learning skills*

Students will be able to use the knowledge and skills acquired in the course in any application that includes a phase of empirical research and data analysis.

***COURSE CONTENT***

Introductory notions of mathematics.

1. *Univariate descriptive statistics*

– From measuring phenomena to building statistical variables.

– Types of statistical variables.

– Absolute and relative frequency distributions.

– Graphical representations and plots.

– Position synthesis measurements.

– Variability synthesis measurements.

– Standardization.

– Symmetry.

2. *Descriptive bivariate statistics*

– Creating and interpreting double entry tables.

– Marginal and conditioned distributions.

– Creating and reading a scatter diagram.

– Stochastic independence and correlation.

– Average dependence: conditioned variances and averages. Principle of variance decomposition. Correlation ratio.

– Linear correlation.

– Linear regression.

3. *Inferential statistics-Introduction to probability*

– From population to sample. Randomness, representativeness and inference.

– Introduction to Probability Theory.

* Discrete and continuous random variables.

– Estimation, estimators properties and confidence intervals

– Statistical tests and hypothesis testing.

– The concept of p-value

– Confidence intervals and hypothesis testing.

***READING LIST***

E. Furfaro, *Appunti di inferenza statistica per le scienze sociali,* EDUCatt, Milano, 2019.

G. Rivellini, *Elementi di Statistica Descrittiva,* EDUCatt, Milano, Edizione 2023 (in printing).

G. Rivellini-A. Signorelli-M.E. Comune, *Eserciziario di Statistica,* EDUCatt, Milano, 2018.

During the first lesson the lecturer will explain how to use the recommended texts.

***TEACHING METHOD***

The lessons will be accompanied by guided exercises on a weekly basis. Using *Blackboard* platform.

***ASSESSMENT METHOD AND CRITERIA***

The assessment will be carried out in a single written test, consisting of both questions on definitions, formulas and meanings of descriptive and inferential statistics indices and exercises on each of the three parts of the program. The theoretical questions will be about 40% of the test, while the remaining 60% will be composed of exercises. The descriptive statistics part will count 20 points and the inference part 12 points, for an overall score of 32 points. Students will obtain a passing mark only if they obtain at least 12 points in the descriptive statistics part and at least 6 points in the inference part. The evaluation will be expressed out of 30; marks with honours will be given to those who reach 31 or 32 points.

The optional carrying out of an assignment by 31/12 of the current year will allow to enrich the final evaluation (by max 3 points), only if the overall exam will be carried out within the winter session.

***NOTES AND PREREQUISITES***

For any requests of clarifications, it is possible to write to the following e-mail address: *giulia.rivellini@unicatt.it**.*

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG or on the Faculty notice board.