# Statistics for psychology

## Prof. Stefano Renzetti

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

The program offers an introduction to the measurement theory in psychology and to the statistical data analysis providing the basic knowledge to develop the methodological expertise and to face the study of the main statistical models applied in the psychological sciences. This class is introductory to all the teaching explicitly related to scientific methods of quantification and measurement.

At the end of the class, the student will be able to identify the research problem, choose the different techniques to address the problem, apply the appropriate statistical and psychometric procedures, develop the mathematical procedures, obtain the main results, and read and interpret the obtained conclusions.

***COURSE CONTENT***

The program includes the basics of the univariate and bivariate descriptive psychometric statistics, some hints of probability theory aimed to provide the tools to approach inferential psychometric statistics and its applications in the social sciences.

The program is divided into 5 units:

Unit 1. *Elements of univariate descriptive statistics*

1.1 Quantification in psychology:

 The concept of measurement

 The measurement scales

 The concept of variable.

1.2 Statistical distributions:

 Statistical surveys

 Frequency distributions

 Graphic representations.

1.3 Univariate descriptive indices:

 Central trend and position indices

 Variability indices

 Shape indices

 Standardized scores.

Unit 2. *Elements of bivariate descriptive statistics: the relationships between variables*

2.1 Construction and interpretation of double-entry tables.

2.2 Relationship between two variables:

 Connection

 Dependency

 Linear correlation

 Spearman index

 Cronbach's Alpha for the measurement of reliability

2.3 Linear regression:

 Least squares method

Determination of the parameters of the regression line and goodness of fit

 Predictive use of the model.

Unit 3. *Elements of probability theory*

3.1 Elementary concepts of probability theory:

 Axioms and theorems of probability theory

 Probability measure.

3.2 Definition of random variable

 Discrete and continuous variables

 The binomial distribution

 The normal distribution

 Central limit theorem.

Unit 4. *Elements of Statistical Inference*

4.1 Population and samples: general notions.

4.2 Parameter estimation:

 The estimator and its properties

 Punctual estimate

 Interval estimate

 The sampling distributions of some estimators.

4.3 Hypothesis testing:

 General principles of tests

 Type I and II errors

 Test function and acceptance and rejection region

 Hypotheses testing on the mean and the proportion

 T-test for independent and paired samples

 Chi square test

 One-way analysis of variance.

Unit 5. *Examples in the field of social sciences*

The goal of this unit is to provide the students with the necessary skills to understand some research methodologies in the field of social sciences by applying statistical methods. In particular, appropriate data analysis techniques will be assessed and applied to answer research questions. The examples will consider the application of descriptive measures, statistical association measures and hypothesis tests.

***READING LIST***

The bibliography includes the slides available on Blackboard. For students wishing to deepen these topics, the following texts are recommended:

M. Sullivan, *Fundamentals of Statistics, third edition, Pearson.*

***TEACHING METHOD***

Lectures and exercises in the classroom. There will be exercises on the use of the statistical software SPSS. The professor will warn the students to bring their laptops.

***ASSESSMENT METHOD AND CRITERIA***

Theoretical competence in statistical analysis techniques will be assessed as well as the statistical-mathematical ability in the practical execution of some exercises and methodological-applicative competence on research questions. The final evaluation will consist of a single written test and an optional oral test at the discretion of the commission, consisting of 11 questions with closed responses (1 point for each correct answer), open questions to evaluate the ability to interpret the outputs produced by statistical analyzes carried out with SPSS (7 points) and two structured exercises (overall 14 points).

***NOTES AND PREREQUISITES***

It is advisable to take the class after having taken the exam of Methodology of Psychological Research I. Attendance in the classroom is strongly recommended. The student must have basic knowledge of research methodology and descriptive statistics.

If the health situation related to the Covid-19 pandemic does not allow for face-to-face teaching, remote teaching will be guaranteed in a manner that will be communicated to students within a certain amount of time*.*

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.

 *Reception time and place*

Prof. Stefano Renzetti will communicate the reception time and place during the first lesson.