. - Statistical Psychometrics

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

The course aims to provide basic knowledge of the most well-known statistical tools, widely used for reworking data in the psychometric field.

The theory will always be accompanied by a significant number of practical exercises in order to consolidate the concepts addressed and render students autonomous in the extrapolation of information from tables showing data in aggregate form.

After taking the exam, students will be able to read and interpret scientific articles containing both descriptive (univariate and bivariate) and inferential (main hypothesis tests) statistical analyses.

The workshop part, in contrast, will allow students to build and rework a real data matrix through Excel, so completing (also from an applicative point of view) their learning of psychometric statistics. This workshop will also support those who, during their thesis work, decide to analyse real data collected, for example, through questionnaires.

The course closely follows the prerequisites for the basic teaching of scientific methods of quantification and measurement.

***COURSE CONTENT***

Module 1

ELEMENTS OF UNIVARIATE DESCRIPTIVE STATISTICS

Quantification in psychology: the concept of measurement, measurement scales, the concept of variable.

Statistical distributions: statistical surveys, frequency distributions, graphical representations.

Univariate descriptive indices: indices of position, indices of variability, indices of shape, standardised indices.

ELEMENTS OF BIVARIATE DESCRIPTIVE STATISTICS: RELATIONSHIPS BETWEEN VARIABLES

Construction and interpretation of double entry tables.

Relationship between two variables: connection, dependence, linear correlation, Spearman index, indices of correlation and cograduation.

Linear regression: least squares method, determination of straight line parameters, predictive use of the model.

Module 2

ELEMENTS OF PROBABILITY CALCULATION

Elementary concepts of probability calculation: axioms and theorems of probability calculation, measuring probability.

Definition of random variable: discrete and continuous variables. Binomial distribution and normal distribution. The central limit theorem.

ELEMENTS OF STATISTICAL INFERENCE

Population and samples: general concepts. Parameter estimation: concept of estimator and its properties, point estimation and interval estimation, sample distributions of certain estimators (the case of the sample mean and proportion). Hypothesis testing: general principles of testing, type I and type II errors, critical region, hypothesis testing on means and on variability, non-parametric tests.

One-way analysis of variance.

***READING LIST***

All the material needed to pass the exam (slides and excel sheets used during the tutorials) will be made available on Blackboard in the *Materials* section.

Basic text:

M. Sullivan (2020). *Fondamenti di statistica*. Edizione Mylab. With digital content for online access. Pearson Editore, ISBN: 8891906050.

**Non-attending students** will have to download and study all the material on Blackboard; they will also have to retrieve from colleagues the notes relating to the exercises proposed in class and the tutorials carried out in the workshop. We recommend contacting the lecturer with any questions (marika.vezzoli@unibs.it).

***TEACHING METHOD***

Theoretical lectures and exercises carried out in class by the lecturer. All the material used will be available to Blackboard students from the first days of the course.

A number of tutorial hours are envisaged in the computer lab; attendance is recommended for a better understanding (from a practical point of view) of the various topics. The slides and Excel sheets used by the tutor will be uploaded to Blackboard, *Materials* section, *Workshop* folder.

***ASSESSMENT METHOD AND CRITERIA***

A written exam, which will include practical exercises to be carried out in full, theoretical closed-ended questions, and comment on an excel output to test students' learning of the exercises carried out in the workshop. The use of a formulary provided by the lecturer (available on Blackboard) is allowed.

For students with certified learning disabilities, it is possible to arrange an oral exam (instead of the written one).

***NOTES AND PREREQUISITES***

It is advisable to study and sit for the exam after having taken the Research Methods in Psychology exam. Attendance in class is strongly recommended for both the lectures and workshop tutorials.

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.