



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Psychometrics and Quantitative Methods

2425-1-F5105P003

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#### Learning area

2\*\*:\*\* Research methods in experimental psychological sciences

#### Learning objectives

##### *Knowledge and understanding*

- Basics of measurement in psychology
- Psychological measures properties
- Basics of inferential statistics and hypothesis testing
- Statistics for prediction
- Statistics for comparing means
- Data dimensional structure

##### *Applying knowledge and understanding*

- Using and evaluating different types of psychological measures
- Understanding of basic logic of scientific empirical testing
- Ability to analyze data in a range of research designs
- Estimating and understanding simple and complex relationships among variables.
- Mastering of R software (laboratory)

#### Contents

The course is about psychometrics and quantitative methods. Fundamental concepts related to measurement in psychology and the logic of hypothesis testing will be presented. Concerning data analyses, the course will focus on statistical techniques for prediction (e.g., multiple regression), for comparing means (e.g., ANOVA), and for uncovering data dimensionality (e.g., Factor Analysis). Emphasis will be given on choosing the adequate statistical analysis and on interpreting the results using Jamovi. The associated laboratory will provide hands-on experience on the statistical software R.

## Detailed program

- Introduction to psychological measurement
- Direct and indirect measures
- Reliability and validity
- Statistical models and inferential statistics
- Multiple Regression
- ANOVA and General Linear Model
- Principal Component Analysis

### *Laboratory*

- Basics of R statistical software and hands-on exercises with data.

## Prerequisites

Basic descriptive statistics (measures of central tendency and dispersion); Basic inferential statistics; Simple linear regression and correlation; t-test. Students lacking such basic knowledge are encouraged to ask for a list of basic references.

## Teaching methods

The course will be held in presence. Teaching will consist of 42 hours of lecture-based lessons. There will also be 16 hours of practical course with practice sections in the computer labs with analyses of research data and discussion.

## Assessment methods

The exam will verify the level of mastery of the course contents with special attention to:

- Understanding the logic of the statistical analyses discussed in the course;
- The ability to choose between different techniques based on the research design and aims;
- Ability to execute the analyses with suggested software;

- Ability to interpret and report the results of the statistical analyses discussed in the course.

The exam will consist of multiple-choice questions and open-ended questions on the course topics.

The multiple-choice questions aim to ascertain the student's preparation and knowledge of the topics. The open questions aim to evaluate the ability to think critically, create links between the acquired knowledge, and apply them concretely to analyze empirical data and discuss the results

## **Textbooks and Reading Materials**

Field, A. P., Miles, J., & Field, Z. (2012). *Discovering statistics using R*. London: Sage (selected chapters).

Navarro DJ and Foxcroft DR (2022). *learning statistics with Jamovi: a tutorial for psychology students and other beginners*. (Version 0.75). <https://www.learnstatswithjamovi.com/>.

Additional readings will be indicated during the lectures.

## **Sustainable Development Goals**

QUALITY EDUCATION

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