UNICUSANO
ROME

Code: SECS-S/01 **Credits: 8**
Matter: Statistics
Main language of instruction: Italian
Other language of instruction: English

Teaching Staff

Head instructor
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Introduction

1. *Objective of the course :*

The aim of the course is to give students all the knowledge and skills that are essential to enter the world of statistics. The course provides the basic techniques of descriptive statistics, probability and inferential statistics. As a whole, these techniques provide a methodology for quantitative analysis useful for descriptive, interpretative and decisional purposes, based on the observation, detection and elaboration of collective phenomena.

Objectives

2. *Course Structure:*

The course is organized into eight subjects. The first two subjects are an introduction to the descriptive statistics. Descriptive statistics is used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data. The third subject refers to spreadsheet, a very useful software to simplify the analysis of data in descriptive statistics. Subjects four, concerns the concept of probability and introduces to sampling and exploring data, as well as basic probability theory and Bayes' rule. Subjects five and six concern the concept of inferenzial statistics. With inferential statistics, we try to reach conclusions that extend beyond the immediate data alone. For example, we use inferential statistics to try to infer from the sample data what the population might think. Or, you use inferential statistics to make judgments about the likelihood that a observed difference between groups is a reliable one or one that could have happened by chance in a study. In the subjects seven and eight

we analyse the historical evolution of statistics from its origins to the dominant Nash theory.

Competencies:

- To know how to solve problems of descriptive statistics
- To know the basic of probabilities
- To understand and know how to use spreadsheets in statistics
- To know how to solve problems of inferential statistics
- To acquire problem solving skills based on quantitative and qualitative information
- To be able to search for, interpret and convey information.
- To acquire the abilities to solve problems and make decisions using relevant information, applying the appropriate methods and placing the problem within the organisation as a whole.
- To be able to descriptively summarise information.
- To be able to work with academic papers.
- To acquire the ability to relate concepts and carry out analytical exercises and their synthesis.
- To acquire skills for independent learning.
- To be able to create arguments which are conducive to critical and self-critical thinking.
- To acquire the ability to put knowledge into practice.
- To be able to retrieve and manage information.

Syllabus

3. *Programme of the course:*

Subject 1. Descriptive statistic: Trend Indices

- Introductory Concepts (Lesson 1.1)
- Central trend Indices (lessons 1.2, 1.3)

Subject 2. Descriptive statistic: the variability indices

- The concept of variability (lessons 2.1, 2.2)
- Concentration and form indices (lesson 2.3)
- Exercise: Trend and shape indices (lesson 2.4)
- Relationships between different characters (lessons 2.5, 2.6)

Subject 3. The spreadsheet

- Introduction to the spreadsheet (Lessons 3.1, 3.2)
- Tutorial: Functions and graphs (lessons 3.3, 3.4)
- Tutorial: Statistical functions (Lesson 3.5)
- Tutorial: The Invoice by spreadsheet (Lesson 3.6)

Subject 4. Probability theory

- Combined calculation (Lessons 4.1, 4.2)
- Probability (Lessons 4.3, 4.4, 4.5)
- Summary exercise from module 1 to Module 4 (Lesson 4.6)

Subject 5. Inferential Statistics

- Theory of estimation (Lesson 5.1)
- Random variables (lessons 5.2, 5.3)
- Bernoulli random variable (lesson 5.4)
- Poisson random variable (lesson 5.5)
- Gaussian random variable (lesson 5.6)
- Random variable exercise (lessons 5.7, 5.8)

Subject 6. The sampling

- Sampling theory (lesson 6.1)
- Sample distributions (Lessons 6.2, 6.3, 6.4)
- Chi-squared Test (Lesson 6.5)

Subject 7. Definition and field of study of statistics

- Phases of descriptive statistics (lessons 7.1, 7.2)
- The spreadsheet and data collection (Lesson 7.3)

Subject 8. History and evolution of

- History of statistical Thinking (lessons 8.1, 8.2, 8.3)
- Game theory (lessons 8.4, 8.5)

Evaluation system and criteria

The exam consists in the performance of a test that tends to ensure the ability to analyse and rework the concepts acquired during the exercises and the various activities (Etivity) carried out during the course in the virtual classes.
The written test includes the resolution of 3 exercises concerning the basic concepts of statistics (descriptive statistics, inferential statistics and probability) and the evolution of the same in time. The exercises overall are evaluated by a minimum of 0 and a maximum of 10 points. The expected learning outcomes about the knowledge of the subject and the ability to apply them are evaluated by the written test, while the communication skills, the ability to draw conclusions and the ability to self-study are evaluated in progress through the Etivity.

Bibliography and resources

4. *Materials to consult:*

The teaching material present on the platform is subdivided into 8 subjects. They cover the whole program and each of them contains notes, slides and video lessons in which the teacher comments on the slides. This material contains all the elements necessary to deal with the study of matter.

5. *Recommended bibliography:*

Books:

- Manuale di statistica – 5th Edition. Simone editions
- Esercizi svolti per la prova di statistica - 6th Edition. Simone editions
- Modeling the World - 5th Edition. Pearson editions
- The foundations of statistics - Leonard J. Savage