Italian code: STAT-01/A	**Credits: 6**
Course: Surveys, information processing and data analysis	
Main language of instruction: Italian	
Other language of instruction: English	

Head instructor
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Objectives

This course focuses on providing theoretical and methodological tools related to statistical analysis and econometrics, applied to a variety of contexts. Students will learn statistical techniques for data analysis, modeling, and inference, with applications including transportation, logistics, and decision-making frameworks.

Course structure

- Introduction to Statistics
- Probability and Statistical Distributions
- Statistical Inference
- Regression Analysis
- Questionnaire

Competencies

A. Knowledge and understanding:
Fundamental concepts of statistical analysis.
Techniques of linear regression and random utility discrete choice models.

B. Applying knowledge and understanding:
Using statistical and econometric methods to analyze real-world data. Applying techniques for sustainable decision-making.

C. Communication skills:

Developing skills to effectively communicate statistical results to professionals and policymakers.

D. Learning skills:

Preparing students for further professional development and advanced statistical applications.

Syllabus

Subject 1: Introduction to Statistics
- Foundations of Statistics
- Role of statistics in data analysis and decision-making.
- Overview of descriptive and inferential statistics.
- Data Types and Data Collection
- Understanding different types of data (quantitative vs. qualitative).
- Sampling methods and data collection techniques.

Subject 2: Probability and
- Basic Probability Concepts
- Probability rules and their applications.
- Random variables and expectations.

Subject 3: Statistical Distributions
- Distributions
- Binomial distribution
- Poisson distribution
- Normal distribution
- Applications of probability distributions in real-world contexts.

Subject 4: Regression Analysis
- Linear Regression Models
- Simple linear regression: concepts, interpretation, and assumptions.
- Estimation of parameters using the least squares method.
- Multiple Linear Regression
- Expanding linear regression for multiple predictors.
- Diagnostics and goodness-of-fit measures.

Subject 5: Questionnaire
- Designing a Questionnaire for a Research Paper.

Evaluation system and criteria

The examination consists of a written test. This includes:
- 4 numerical exercises
- The realization of a questionnaire

Bibliography and resources

1. *Materials to consult*

Notes written by the instructor are available in Italian (part of the notes are also available in English).