UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Analisi Statistiche per I Processi Aziendali

2526-1-F7703M006-F7703M006-1

Learning objectives

The course aims to provide students with a solid methodological and practical foundation in the use of statistical tools for the analysis and evaluation of business processes. The techniques covered will enable students to interpret economic and managerial phenomena, assess relationships between variables, monitor the temporal evolution of key indicators, and support operational, strategic, and control-related decision-making.
The approach is oriented toward developing quantitative skills applicable in real-world contexts, with particular focus on performance evaluation, forecasting, and business risk analysis.

At the end of the course, the student will be able to:

- understand the main statistical tools applicable to business processes and recognize the role of statistics in decision-making, management, and control contexts, with particular reference to regression, analysis of relationships between variables, time series analysis, and performance assessment;
- apply appropriate statistical techniques to real or simulated business data, using R software to build models, analyze output, and extract insights useful for planning, monitoring, and supporting business decisions;
- critically assess the suitability, accuracy, and limitations of the statistical models used, justifying methodological choices in relation to the objectives of the analysis and the business context;
- communicate statistical analysis results clearly and effectively by producing comprehensive interpretative reports and using appropriate graphical representations, including for non-specialist audiences or professionals from different organizational functions;
- independently update and deepen the statistical knowledge acquired, adapting developed skills to new tools and contexts, with particular attention to the needs of business analysis, reporting, and control.

Contents

The course introduces fundamental statistical methods for the analysis and evaluation of business processes, with reference to operational, strategic, and control-related contexts. It covers techniques for analyzing relationships between variables, estimating and validating predictive models, and constructing indicators for performance evaluation.
The theoretical approach is complemented by practical activities in the R environment, aimed at developing operational skills using real or simulated business data.

Detailed program

Methodological Section (25 hours)

1. Statistics for understanding and controlling business processes

- The role of statistical analysis in decision-making processes
- Types of variables and structures of business data
- Summary indicators and measures of variability
- Evaluation and representation of economic and managerial phenomena

2. Analysis of relationships between variables and predictive models

- Multiple linear regression: interpretation and business applications
- Hypothesis testing and evaluation of model fit
- Predictor selection and multicollinearity

3. Evaluation of economic and financial performance

- Financial statement indicators and their statistical interpretation
- Construction of dashboard-style reports
- Comparative analysis (benchmarking) between companies or business units
- Use of indicators to support management control

R Lab (10 hours)

- Introduction to the R environment: structure, basic commands, and packages
- Data import and data management
- Implementation of regression models
- Graphical and diagnostic analysis of models
- Models for evaluating economic and financial performance

Prerequisites

A basic knowledge of descriptive statistics (univariate and bivariate), probability (random variables and main distributions), and statistical inference is required, with particular reference to point and interval estimation, hypothesis testing on means and proportions, simple linear regression, and introductory concepts of multiple regression.

Teaching methods

The course includes 25 hours of traditional classroom teaching and 10 hours of interactive activities in the statistics lab (using R). If the laboratories are unavailable due to renovation work, the activities will be divided between in-class sessions and remote sessions, both conducted using the virtual lab environment.

Assessment methods

The exam consists of two components, each contributing equally to the final grade:

- Individual written exam (50% of the final grade): the exam consists of 3 questions, each including both theoretical and practical items aimed at assessing the student's understanding of the statistical concepts covered in the course and their ability to correctly interpret analytical outputs. The duration of the exam is 2 hours. The score is expressed in 30-ths (minimum 0, maximum 31).

Project work (50% of the final grade): an applied analysis project (individual or in groups of up to 3 students) carried out on a provided or selected dataset using R software. The project includes the submission of a written report and an oral presentation of the results, to be delivered during the final days of the course. The score is expressed in 30-ths (minimum 0, maximum 31).

The final course grade will be calculated as the arithmetic mean of the two scores.

Textbooks and Reading Materials

- Teaching materials provided during the course: slides, exercises, and datasets to support theoretical and practical activities.
- Biggeri, L., Bini, M., Coli, A., Grassini, L., & Maltagliati, M. (2023). Statistica per le decisioni aziendali. 2nd edition, Pearson.
- Giudici, P., & Figini, S. (2009). Applied Data Mining for Business and Industry. 2nd edition, Wiley, Chichester (UK). Freely available to UniMiB users at: https://unimib.on.worldcat.org/discover (login required with university credentials).

Semester

First semester

Teaching language

Italian language

Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE