UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Statistics for Business Management

2526-2-E1805M007

Learning objectives

Economic and business disciplines often deal with big sets of data, with many different characteristics. In addition, taking managerial decisions is often made difficult due to the uncertainty connected with a vague and not-systematic knowledge of the context. This course guides students to the right choice of some statistical tools, aiming at summarizing and processing data to support decisions.
Specific goals of the course are as follows:

- *knowledge and understanding:* students should know the possible kinds of data, the possible aspects of data which need to be summarized, the tools offered by statistics at this aim; students should know the statistical techniques which combine uncertainty measurement and data processing; students should know the characteristics of a statistical software
- *applied knowledge and understanding:* students should be able to locate the exact kind of data faced and to assess their quality; students should be able to locate the right statistical tools for a given summarization problem; students should be able to translate business decision problems into a statistical language; students should be able to locate the right statistical technique to support decisions; students should be able to work with a statistical software
- *making judgements:* students should be able to prevent incorrect or ambiguous interpretations of data; students should acquire a critical thinking of summarized data reported by third parties, possibly by proposing corrections; students should be able to manage the subjectivity in the interpretation of some results of data processing.
- *communication skills:* students should be able to choose suitable summarization tools, so that their results are easily interpreted by others, even by people without any specific skill in statistics; students should be able to customize some supporting statistical tools to the skills of decision makers
- *learning skills:* students should be able to understand other statistical technique (not covered in this course), suitable for other business problems faced for study or work

Contents

Basic univariate descriptive statistics. Measures of association and of linear dependence. Probability, random variables and elementary probabilistic models. Sampling distributions, estimation and confidence intervals. Hypothesis testing on one or two populations. Inferential analyses about associations.

Detailed program

Exploring Data With Graphs and Numerical Summaries. Different Types of Data. Graphical Summaries of Data. Measuring the Center of Quantitative Data. Measuring the Variability of Quantitative Data. Linear Transformations and Standardizing.
Exploring Relationships Between Two Variables. The Association Between Two Categorical Variables. The Relationship Between Two Quantitative Variables. Predicting the Outcome of a Quantitative Variable
Probability and Probability Distributions. Measures of Randomness. The Rules of Probability. Conditional Probability. Random Variables. Binomial and Normal Distributions.
Sampling Distributions. Distribution of the Sample Mean.
Point Estimation and Confidence Intervals. Point and Interval Estimates of a Population Mean. Point and Interval Estimates of a Population Proportion.
Hypothesis Tests. Decisions and Types of Errors in Significance Tests. Significance Tests About a Mean. Significance Tests About a Proportion.
Comparing Two Groups. Analyzing the Association Between two Categorical Variables.

Prerequisites

None

Teaching methods

12 2-hour lessons, held both in direct-teaching mode (first part) both interactive-teaching mode (second part) and carried out remotely.
6 2-hour lessons, held in direct-teaching mode and carried out in presence.
6 2-hour practical sessions (exercises) held in interactive-teaching mode and carried out remotely.
3 2-hour practical sessions (exercises) held in interactive-teaching mode and carried out in presence.

Assessment methods

The assessment methods consist of a written test, followed by an oral test. No partial tests are provided. The oral test can be only taken if the written test is graded 18/30 at least.
The written test contains just exercises, quite similar to the examples used during lesson or during exercise sessions. The written test is graded with a total score of 31. Examples of written tests, with solutions, will be found on the e-learning. Usually, written tests are graded on the same day and just before the oral test.
The oral test includes a discussion about the written test and it deals with the theory developed during lessons. In addition, the ability of students to work with a statistical software is tested.

Textbooks and Reading Materials

- Agresti, A., Franklin, C., Klingenberg, B. *Statistica – L'arte e la scienza d'imparare dai dati (quinta edizione)*. Ed. Pearson, 2025.
- Online resources of the textbook
- Further materials for exercizes on the e-learning

Semester

Second semester

Teaching language

Italian

Sustainable Development Goals