UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Statistical Methods For Business - 1

2122-2-E1802M119-T1

Learning objectives

Students will be prepared to locate proper statistical techniques to support decision-making in business. Students will learn how to manage uncertainty in business and how to strive for quality improvement in production, by using suitable data-processing tools. Students will develop a critical approach when dealing with data processed by third parties, focussing on the fulfillment of the underlying assumptions. Moreover, students will develop the ability to communicate the outcomes of data processing, even to people without any statistical knowledge. Finally, students will learn how to understand other statistical techniques, not covered in this course, which might be dealt with for study or work.

Contents

First, the course aims at providing suitable knowledge of probability and of statistical techniques for sample data, especially those concerning economic phenomena and business. Moreover, statistical techniques to monitor and to improve the quality of manufacturing processes will be studied.

Detailed program

Events and probability. Random experiments, basic combinatorial calculus, assignment of probabilities. Basic rules of probability. Probability of the complement of an event, union of events, intersection of events. Conditional probability. Product rule. Independent events. Bayes theorem. Discrete random variables. Probability functions. Expectation. Variance. Discrete uniform distribution. Binomial distribution. Poisson distribution. Hypergeometric distribution. Continuous random variables. Continuous uniform distribution. Normal distribution. Exponential distribution. Normal approximation to the binomial distribution.

Sampling and sampling distributions. Finite and infinite populations. Parameters and statistics. Simple random sampling and other schemes of sampling. Point estimation. Estimators and their properties. Estimators and sampling distributions. Sample mean. Sample proportion. Interval estimation. Confidence intervals, margin of error, confidence level. Confidence intervals for the population mean: known and unknown variance. Determination of the sample size. Confidence intervals for a proportion.

Hypothesis testing. Null and alternative hypothesis. Type I and type II errors. Significance level of a test. Critical-value approach and p-value approach. One-sided and two-sided tests. Relationship between two-sided tests and confidence intervals. Tests on the population mean: known and unknown variance. Tests on a proportion. Tests and confidence intervals for the difference of two means: paired and independent samples. Tests and confidence intervals for the difference of two proportions. Chi-squared test: goodness-of-fit test and test of independence.

Linear regression model.

Control cards.

Prerequisites

Basic statistics. Descriptive statistics. Basic mathematics.

Teaching methods

The course includes the presentation of all contents through synchronous remote lessons.

Assessment methods

The exam consists of questions about theory and exercises. The former test students' knowledge and understanding of the main concepts of the subject. The latter measure students' ability in the application of such concepts to solve simple practical problems.

Textbooks and Reading Materials

D. Anderson, D. Sweeney, T. Williams "Statistica per le analisi economico-aziendali", 2010, Apogeo Education – Maggioli Editore.

D. C. Montgomery "Controllo Statistico della Qualità (seconda edizione)", 2006, McGraw-Hill

Reference to the textbooks is crucial to attend lessons and practical sessions. Additional materials are provided by the e-learning website.

Semester

Second semester.

Teaching language

Italian.