UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Statistical Methods for Business - 2

2223-2-E1802M119-T2

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

The course aims at providing suitable knowledge of probability and of statistical techniques for sample data, especially those concerning economic phenomena and business. Statistical techniques to monitor and to improve the quality of manufacturing processes will also be dealt with.

Detailed program

Random experiments and probablity models. Methods for probability assignment. Basic combinatorial calculus for the computation of classical probabilities. Basic rules of probability. Probability of complementary events, unions and intersections. Conditional probability. Product rule. Independent events. Bayes theorem. Random variables. Discrete and continuous distributions. Expectation and Variance. Commonly used distributions: uniform distributions (discrete and continuous), binomial distributions, hypergeometric distributions, Poisson distributions, exponential distributions and normal distributions. Normal approximations.

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. Methods for testing the assumptions. Parameter estimation and confidence intervals. Significance test. Confidence intervals for conditional means and prediction intervals. Introduction to multivariate regression models.

Prerequisites

Basic statistics. Descriptive statistics. Basic mathematics.

Teaching methods

Frontal lessons (theory and examples).

Assessment methods

The exam is written. The exam consists of three exercises which test students' ability to solve practical problems and to interpret the results. Students who don't pass the written exam but whose score is close to sufficent will be asked to take an additional oral exam.

Textbooks and Reading Materials

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

Slides delle lezioni fornite dal docente (sulla pagina eLearning del corso).

Semester

Second semester.

Teaching language

Italian.

Sustainable Development Goals

QUALITY EDUCATION | GENDER EQUALITY | INDUSTRY, INNOVATION AND INFRASTRUCTURE | RESPONSIBLE CONSUMPTION AND PRODUCTION