UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Statistics I - Second Part

2425-2-E4102B063

Learning objectives

The course is proposed as a natural continuation of the Statistics I course. Some concepts related to bivariate distributions are taken up. Aspects related to the definition and verification of the goodness of adaptation of mathematical models, such as polynomial functions or linearizable models, in a descriptive context that allow the definition of the functional link existing between two (or more) characters are present. To estimate the coefficients of the models, the least-squares method is used.

Knowledge and understanding

This course will provide knowledge and understanding to:

- Estimate, using the method of least squares, the parameters of different polynomial and linearizable regression models (bivariate case and regression plan)
- Know how to evaluate the goodness of models' adaptation to data (bivariate case and regression plan)

Ability to apply knowledge and understanding

At the end of the course the students will be able to:

- Choose the model that best fits given data
- Interpret the model for descriptive purposes and comment on the results obtained

The teaching allows the student to acquire a solid foundation in the use of descriptive statistics necessary in any work context and that represent an essential basis for the continuation of the university course.

Contents

Main techniques of bivariate statistics in the field of polynomial regression

Detailed program

- Polynomial regression
- Least squares method
- Data model adaptation
- Residuals of interpolation
- Improvement index
- Multidimensional regression
- Partial correlation coefficient

Prerequisites

The course of Statistics is a prerequisite for the course of Statistics I - Complements.

The knowledge of concepts of mathematical analysis, such as derivatives, is requested.

Teaching methods

Lectures of theory and examples in the classroom. Exercises in the classroom with some exercises on the blackboard.

Classroom lectures: 35 hours
Classroom exercises: 12 hours

Assessment methods

The exam consists of a written test comprising 10 theory questions and some exercises. It is necessary to reach the sufficiency (18/30) in both parts that make up the written test.
The final mark in the written test is given by the arithmetic mean of the two marks only if both are sufficient.

Optional oral exam on request of the teacher or the student only if the written test is sufficient.

The written test consists of semi-open-ended theory questions and numerical exercises (to be performed with the calculator). The theoretical questions allow verifying the knowledge of the least-squares method applied to the estimation of the parameters of different regression models and their main characteristics. The exercises allow verifying the ability to choose, calculate and comment regression models in the context of simple practical problems. Furthermore, the theoretical questions and the exercises (with the relative comments) allow verifying the ability to express themselves with an appropriate technical language.

The oral test consists of exposition of theory topics. The student must be able to expound and argue theoretical concepts while also knowing how to make connections between different topics.

Textbooks and Reading Materials

G. Boari, G. Cantaluppi, Note di statistica descrittiva e primi elementi di calcolo delle probabilità, EDUCatt Università Cattolica, Milano, 2020

G. Leti, L. Cerbara, Elementi di statistica descrittiva, Il Mulino, Bologna 2009

F. Mecatti, Statistica di base - Come, quando, perchè, McGraw-Hill, Milano 2022

L. Santamaria, Statistica descrittiva – Applicazioni economiche e aziendali, Vita e Pensiero, Milano 2006

Zanella, Elementi di statistica descrittiva, CUSL, Milano 2000

Semester

I Semester, I period

Teaching language

Italian

Sustainable Development Goals

QUALITY EDUCATION