UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biostatistics

2627-1-F0902D004-F0902D00401

Aims

Basic knowledge of the most important statistical-methodological tools of the descriptive and inferential statistics for: design of experiments, data collection and analysis, the complexities of lab data.

The student will be able to: understand the main concepts of study design, implement statistical analysis, read the scientific literature presenting descriptive and inferential statistic results.

Contents

Basics of probability calculation
Confidence interval on the parameter p probability of an event (proportion)
Frequency tables and graphs
Order of magnitude and dispersion indicators
Gaussian Distribution (to approximate the trend of a histogram)
Confidence interval on the mu parameter
Use of the Gaussian distribution to construct confidence intervals
Hypothesis testing

Detailed program

- Calculation of probabilities (Chapter 5)
  Definition of experiment
  Sample space, simple and compound events
  Probability with classical and Frequentist approach

Incompatible, dependent and independent events
Probability of union and intersection
Conditional probability

- Confidence interval on the proportion p (Chapter 9)
  Calculation of the point estimate of a probability
  Confidence interval: calculation of the interval estimate of a probability, interpretation, simulation
  Planning the interval estimate of a probability

- Organizing and summarizing data (Chapter 2 and Chapter 3)
  Construction of a frequency table for a qualitative characteristic: absolute, relative, relative frequencies %
  Graphic representation with bar and pie charts
  Construction of a frequency table for a quantitative characteristic: aggregation into classes, absolute, relative, relative % frequencies
  Graphic representation with histogram
  Synthetic indicators of the order of magnitude and variability of the quantitative phenomenon: arithmetic mean (and/or median) and standard deviation

- Gaussian Distribution and its use as a histogram approximation method (Chapter 7)
  Gaussian distribution: genesis and area calculation method

- Maximum likelihood estimation of p and mu
  Complementary to UNITS B and D

- Confidence interval on mu (Chapter 9)
  Confidence interval: calculation of the interval estimate of a mu parameter, interpretation, simulation
  Planning the interval estimation of a mu parameter

- Use of the Gaussian distribution to construct the confidence intervals in UNITS B and F
  sample distributions of the proportion and the mean

- Testing hypotheses about p (Chapter 10)

- Hypothesis testing on category distribution (Chapter 12)

Prerequisites

None.

Teaching form

Teaching with frontal hours:

- 9 lessons of 2 hours held in presence mode;
- 3 lessons of 2 hours carried out remotely (pre-registred video clip);
- 4 lessons of 2 hours held in remote interactive mode (off line assignments);

Textbook and teaching resource

- Book: Fondamenti di statistica Micheal Sullivan III, traduzione a cura di Emma Zavarrone, Pearson 2020, diponibile anche come e-book https://www.pearson.it/opera/pearson/0-7264-fondamenti_di_statistica
- Slides
- Video Clip

Semester

First semester.

Assessment method

Written test

- The written exam takes place on the university's esamionline platform in the laboratory
- 9 questions with 4/5 answers of a calculation required
- 1 open question
- 30 minutes
- 3 points scored for each question

Office hours

To be defined with the student by email contact laura.antolini@unimib.it

Sustainable Development Goals

QUALITY EDUCATION | GENDER EQUALITY