



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Biostatistics

2526-1-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-registered 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, disponibile anche come e-book [https://www.pearson.it/opera/pearson/0-7264-fondamenti di statistica](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](mailto:laura.antolini@unimib.it)

## Sustainable Development Goals

QUALITY EDUCATION | GENDER EQUALITY

---