



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Statistica

2021-1-E1601N063

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#### Learning objectives

The course is mainly methodological and aims at the following purposes:

- a) to introduce students to statistical reasoning and basic statistical tools
- b) to introduce the basics of both univariate and bivariate Descriptive Statistics; to introduce the basics of Statistical Inference; to unify and formally collocate methods and techniques of data analysis which the students might have already met in previous school/university courses; to provide new statistical tools with both descriptive and inferential purposes.

#### Contents

The course offers an introduction to the formal principles of the modern statistical reasoning, from the basics of descriptive statistics to the basic instruments of statistical inference.

Applications are covered through exercise classes supplementing the main theoretical course.

#### Detailed program

- Basics of univariate Descriptive Stats: statistical population & unit, statistical variable and its values; (complete) data collection, frequency distributions; mean values and measure of variability.

- Basics of bivariate Descriptive Stats: joint (complete) data collection of a pair of statistical variables and two-way table; independence; concept and measure of (global) association, dependence and (linear) correlation; introduction to regression and linear (bi-variate) model.

- Basics of Statistical Inference: sampling, sample variability and sampling error; essential elements of probability; point estimate and estimators for the population mean and percentage (relative frequency); estimator's properties, Mean Squared Error and Standard Error; Confidence Interval for the population mean and percentage (relative frequency), exact for Normal population and approximated for Large Sample; (Significance) Test Z and T for null hypotheses on the population mean and percentage (relative frequency), Independence Chi Square Test for contingency table.

***At the time of ending of classes (May 2019) the detailed program (with references to the textbook) will be available on line. It will remain valid for all the exams of the academic year 2019/20***

## Prerequisites

Credits from Mathematics for Social Sciences (1st year) are **strongly suggested**.

Sets and their cardinality (finite, countable and uncountable); real intervals; simple linear parametric equations; (real) function and its values; polynomials and the slope-intercept line; minimum of a real function.

## Teaching methods

Theory lessons and exercise classes

During the Covid-19 emergency, both lesson and exercise courses will be mixed-mode: partial "in-presence" classes plus video-recorded asynchronous classes, integrated by periodical interactive web-meeting activities.

Additional material and forum online <http://elearning.unimib.it>, including slides of all classes (theory and exercises) and written tests of the previous academic year.

### **Additional online didactic activities**

Weekly Tests <http://elearning.unimib.it> : additional exercises online, as multiple-choices Quiz, to be carried out autonomously and optionally.

Intermediate Assessments online <http://elearning.unimib.it> as time-based multiple-choice Quiz, to be carried out autonomously and optionally for anyone enrolled on the elearning page. The Intermediate Assessments can be used to : 1) prepare for the written exam (online and / or in presence); 2) under conditions that will be published on the elearning page at the beginning of the course (October 2020), replace the written exam and access to a simplified online exam consisting of open theoretical questions chosen from a list that will be published at the end of the course (December 2020).

## **Assessment methods**

Written Tests with both numerical exercises and theoretical questions

### **Rules for Regular "in presence" Written Exams**

A tentative score is provided for each question/exercise (on a scale 1-30, for a correct and complete answer)

Duration of the written test: 2 hours. Withdrawal allowed anytime.

Optional Oral test provided on demand and upon a positive score in the written test.

### **Rules for Online Written Exams during the Covid-19 emergency**

It has a structure as similar as possible to the "regular in presence" written exam (see available texts from the previous academic year). With the following differences:

- 1) Online Test at [esamionline.elearning.unimib.it](https://esamionline.elearning.unimib.it) (Respondus + WebEX meeting via smartphone)
- 2) The allotted time to complete the written exam online can be reduced up to 1 hour, depending on the number of students.
- 3) Exercises that require computation and numerical answers are transformed into multiple-choice questions.
- 4) "Theoretical" exercise transformed into open questions, to be filled in by the keyboard of your computer / tablet, without the need for formulas, tables or graphs.
- 5) Theoretical open questions are chosen from a list that will be published at the end of the course (December 2020)

The uploaded online exams are inspected individually and the final evaluation is in the judgment and responsibility of the teacher.

The results will be uploaded and notified in the same way as for "regular in presence" written exams, with optional oral exam for sufficient evaluation to the written one and upon enlisting on [segreteriaonline](https://segreteriaonline.unimib.it).

## **Textbooks and Reading Materials**

### **In Italian**

F. Mecatti, "Statistica di Base. Come, quando e perché". McGraw-Hill, II ed. (2015);

L. Pagani, "Complementi ed esercizi di statistica descrittiva ed inferenziale" Amon (2015);

Additional digital tools and materials at <http://elearning.unimib.it> (see previous section Teaching methods)

**English textbooks and additional digital resources will be advised on demand and/or according to specific needs**

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