



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Big Data in Health Care

2021-2-F9101Q028-F9101Q028M

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#### Aims

This course aims to provide the basic concepts of clinical epidemiology that are at the basis of a proper methodological approach to a research project in medicine. The student will be able to deal with big data in health care particularly focusing on several aspects including design, data management and analysis. The student will be able to implement optimal design strategies for clinical trials and observational studies. The student will be able to apply regression models for the analysis of time to event and longitudinal data and to use these models for risk prediction and for the assessment of causal relations between variables. The student will be able to use proper statistical methods for the analysis of genetic data.

#### Contents

Clinical epidemiology. Designs of clinical trials and observational studies. Statistical methods for time to event data, repeated measures data, risk prediction models, causal analysis. Statistical methods for the analysis of omics data.

#### Detailed program

Basics in clinical epidemiology.

Study design in medicine: cross-sectional, case-control, case-cohort, randomized trials, biomarker driven designs.

Statistical methods for time-to-event data, repeated measures data, risk prediction models (building and validation), causal analysis.

Penalized regression methods for the analysis of time-to-event data in omics.

## **Prerequisites**

Descriptive and inferential statistics.

## **Teaching form**

Lectures with the use of active methodologies (such as microsimulations) will be interspersed with computer labs in supervised small groups activities using R software. Critical reading of methodological clinical papers.

In case the emergency situation due to the Covid-19 pandemic will persist until the second semester, lectures will be supplied in asynchronous modality, through videos available from the e-learning course page, and by synchronous videoconferences on the WebEx platform.

## **Textbook and teaching resource**

Teaching slides.

The following textbooks are suggested:

Machin D., Campbell M.J. (2005). Design of studies for medical research, Chichester: John Wiley & Sons.

E. Marubini, M.G. Valsecchi (1995). Analysing survival data from clinical trials and observational studies, Chichester: John Wiley & Sons.

Vittinghoff, E., Glidden, D. V., Shiboski, S. C., McCulloch, C. E. (2005). Statistics for biology and health. Regression methods in biostatistics: Linear, logistic, survival, and repeated measures models. New York, NY, US: Springer Publishing Co.

Laird N.M., Lange C. (2011). The fundamentals of modern statistical genetics. New York, NY, US: Springer Publishing Co.

## **Semester**

Second semester

## **Assessment method**

Final questionnaire with closed answer to evaluate the preparation on the overall program. This mark will contribute for the 40% of the final judgement.

Final individual project exercise on big data to test the ability of the student in the application of research methodology in health care. This mark will contribute for the 60% of the final judgement.

## **Office hours**

On request by e-mail.

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