UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Principles of Biostatistics

2021-3-E4102B073

Learning objectives

The aim of the course is to teach how to design an experimental or an observational study in the biomedical field, how to choose the proper statistical method in analyzing data and how to interpret the results.

Knowledge and understanding

This course will provide knowledge and understanding regarding:

- the identification, in the context of biomedical studies, of the nature of the outcome variables and of the factors potentially associated with the outcome

- the choice of the right statistical method according to the nature of the variables of interest and of the research question

Applying knowledge and understanding

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

- plan and perform the data analyses according to the nature of the variables of interest

- critically interpret and discuss the results

The course will provide a sound basis for choosing the right statistical methods as well for interpreting the results of the analyses in the context of the biomedical sciences.

Contents

1. Introduction to the course

2. Analysis of continuous responses

3. Analysis of categorical responses

4. Analysis of time-to-event (survival) data

5. Insights on the methodology of clinical and epidemiological research

Detailed program

1. Introduction to the course

1.1 The steps of the biomedical research and the role of the biostatistician

2. Analysis of continuous responses

2.1 T-test and analysis of variance

2.2 Assumptions

2.3 Non-parametric tests

2.4 Simple and multiple linear regression

3. Analysis of categorical responses

3.1 Analysis of contingency tables

3.2 Simple and multiple logistic regression

3.3 . Dose-response relationship

4. Analysis of time-to-event (survival) data

4.1 Time-to-event data

4.2 Non-parametric estimate of the survivor function (Kaplan-Meier method)

4.3 Regression models for survival data: the Cox proportional hazard model

5. Insights on the methodology of clinical and epidemiological research

5.1 Random sampling and random assignment, bias, confounding, causal inference

5.2 Power and sample size calculation in a clinical trial

5.3 Explorative research

5.4. Understanding risk: absolute risk and relative risk

Prerequisites

None

Teaching methods

Lectures

Computer lab with applications in SAS

During the Covid-19 emergency period, lessons will be conducted in a mixed mode: some classroom lessons and mainly asynchronous / synchronous video lessons.

Assessment methods

Written exam (only for attending students)

During the course, a dataset from a real biomedical study will be provided.

Data must be analyzed using all the methods considered suitable for achieving the aims of the study.

The results must be presented following the style of a research paper.

The written exam will test the student's ability to lay out a research paper, from the description of the collected data and the aims of the work, to the justification of the chosen analysis methods and results discussion.

Oral exam

The oral exam will be based on the course textbook.

The oral exam will test the student's knowledge of the main statistical methods used in the biomedical field.

During the Covid-19 emergency period, oral exams will be online. They will be carried out using the WebEx platform.

Textbooks and Reading Materials

Martin Bland – An Introduction to Medical Statistics – Oxford University Press

Semester

Semester I, Cycle I

Teaching language

Italian