UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Principles of Biostatistics

2627-3-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

- Introduction to the course

- Analysis of continuous responses

- Analysis of categorical responses

- Analysis of count responses

Detailed program

1. Introduction to the course

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

1.2 Introduction to the SAS software for the management and analysis of biomedical data

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 count outcomes **

4.1 Characteristics of count data

4.2 Frequency measures based on events and person-time

4.3 Regression models for count data

Prerequisites

Knowledge of descriptive and inferential statistics: probability distributions, estimation, confidence intervals, hypothesis testing, and p-values. Knowledge of the contents of the Medical Statistics course is also required, particularly frequency and association measures, main study designs, and interpretation of results from biomedical research.

Teaching methods

Classes can be conducted in two formats: in the first, the instructors will present the concepts (**lecture mode**); in the second, the instructors will interact with the students by proposing problems based on real or simulated clinical data, to be solved in groups using the specified software (primarily SAS, but also R, Excel, or data analysis or simulation web pages). Students will solve and discuss the problems, with corrections made together with the instructors (**interactive mode**).

The ratio between lecture and interactive hours will be approximately 2:1. Some lecture-mode classes will be conducted remotely (with an approximate ratio of 1:1 between in-class and remote lessons).

Assessment methods

The examination will take place on a single day and will be divided into two sections:
- in the first section, participants will be required to answer open-ended questions in writing related to the course topics;
- in the second section, using the computer, one or more problems based on real or simulated data will be presented; the SAS software should be used to solve them.
In both sections, it will not be possible to consult any type of material, nor access the web.

Textbooks and Reading Materials

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

Semester

Semester I, Cycle I

Teaching language

Italian

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING