



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Generalized Linear Models in Epidemiology and Medicine

1920-3-E4102B059

Learning objectives

The student will be able to formulate and implement the correct _____

3. Making Judgements

The student will acquire the tools to construct, interpret, and assess the Generalized Linear Models. Such abilities will be boosted both from a theoretical point of view and from a practical standpoint, by using the statistical software Stata. At the end of the course, the students should be able to use the correct approach when facing with the need to determine evidence from epidemiological and medical studies, with the ultimate goal of being independent when analyzing data.

4. Communication skills

The student will learn how to communicate the results and findings from the statistical analyses, assessing the statistical and epidemiological implications of the results from the models being applied.

5. Learning skills

Contents

1. Review of basic principles of probability and inference
2. The Linear regression model
3. The Generalized Linear Regression model: the exponential family
4. The Logistic regression model
5. The Ordinal logistic regression model
6. The Poisson regression model
7. Course review

Detailed program

- Random variables
- Statistical Distributions
- Methods for model estimation
- Confidence intervals and hypothesis testing

2. ____

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- Model definition
 - Analysis of variance and analysis of covariance
 - Goodness of fit
 - Diagnostics
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- Exponential family
- Maximum likelihood estimation
- Definition of deviance
- Likelihood likelihood ratio test

- Bernoullian and binomial data
- Model definition: logit function

Prerequisites

Both courses on Statistics II and Medical Statistics must be successfully passed before

Teaching methods

The material will be presented in class with formal lectures plus applied work using Stata, one of the most used statistical software in biostatistics and epidemiology, with the twofold goal of teaching the software as well as how to interpret the models introduced in class.

Assessment methods

In the written part, we will assess both theoretical and some more applied aspects of the course, meaning how to correctly formulate the statistical models and interpret the findings, based on the software being used (Stata). In particular to assess the learning outcomes of the course the exam will be based on 1) model formulation 2) model application 3) interpretation of the parameters 4) statistical inference 5) diagnostic and model fitting) choice of best model 6) Reporting of findings

In the oral discussion (n.b, it is not compulsory) we will assess the capacity of the student in the interpretation and communication of the findings and if the right language is being used. the oral discussion will also serve as a tool to discuss unclear answers from the written part.

No different exams will be provided between attending and no attending students.

Textbooks and Reading Materials

Main:

Dobson, A.J. An introduction to generalized linear models, 4rd Edition. Chapman & Hall/CRC.B

Secondary:

Casella, G. and Berger, R.L. Statistical Inference, 2nd Edition. Brooks/cole. Cengage Learning

Class Material:

Instructor's notes, papers and other material will be uploaded on the course homepage

Semester

II Semester, IV term

Teaching language

Italian with English material
