Generalized Linear Models

Instructors: V.VASDEKIS

Course Code: 61103
Core Course, 1st semester, 7.5 ECTS units
Course level: Graduate (MSc)
Language: English

Course Description

Introduction to statistical modeling, exponential family of distributions, part of a GLM, binomial data, logit models, contingency tables, log-linear models, Poisson models, overdispersion, normal data, Gamma data, polynomial-ordinal regression models, linear mixed models, GEE models, GLMM models. All applications include the use of the R language.

Prerequisites

Students should have basic knowledge of mathematical calculus, linear algebra, and probability theory.

Target Learning Outcomes

Upon successful completion of the course, students are expected to understand if the nature of their data allows application of a generalized linear model (knowledge and understanding). They should also be able to define the appropriate generalized linear model to the data at hand (application). They should be able to fit this model and interpret the results of analysis (skill). Finally, they should be able to explain to scientists of other disciplines the results of their analysis (synthesis).

Recommended Bibliography

- Agresti (2013). Categorical data analysis, Wiley Atkinson (1985). Plots, transformations and regression, Oxford university Press Carroll and Ruppert (1988). Transformation and weighting in regression, Chapman and Halλ Chatterjee and Price (1977). Regression analysis by example, Wiley.
- Christensen R. (1998). Analysis of variance, design and regression. Chapman and Hall. Collett, D. (1991) Modelling Binary data, Chapman and Hall Cook and Weisberg, S. (1982). Residuals and Influence in regression, Chapman and Hall
- Dobson, A., Barnett, A.G (2008). An introduction to generalized linear models, Chapman and Hall. Draper and Smith (1981). Applied regression analysis, Wiley.

- Fitzmaurice, Laird and Ware (2004). Applied longitudinal data analysis, Wiley. Hedeker and Gibbons (2006). Longitudinal data analysis.
- McCullagh, P and Nelder, J.A. (1989) Generalized Linear Models, Chapman and Hall. Montgomery, D.C. (1989) Design and Analysis of Experiments, Wiley
- Montgomery, D.C., Peck, E.A. and Vining, G.G. (2001). Introduction to linear regression analysis. Wiley. Ryan (1997). Modern regression methods, Wiley. Weisberg, S. (1985) Applied Linear Regression, Wiley Venables W.N. and Ripley B.D (1999) Modern Applied Statistics with S-Plus, Springer

Teaching and Learning Activities

One three-hour lecture per week, one one-hour laboratory, study exercises as homework (some to be submitted).

Assessment and Grading Methods

The final grade is the weighted average of the final examination grade (70%) and the grade of the study exercises to be submitted (30%).