

The Hebrew University of Jerusalem

Syllabus

GENERALIZED LINEAR MODELS - 52542

Last update 06-09-2014

HU Credits: 3

Degree/Cycle: 2nd degree (Master)

Responsible Department: Statistics

Academic year: 3

Semester: 1st Semester

Teaching Languages: English

Campus: Mt. Scopus

Course/Module Coordinator: Samuel Oman

Coordinator Email: oman@mscc.huji.ac.il

Coordinator Office Hours: flexible

Teaching Staff:

Prof Sam Oman

Course/Module description:

The formulation and application of regression models appropriate for modelling a non-normally distributed response.

Course/Module aims:

For applications in which we wish to model a non-normally distributed response (e.g., binary) in terms of explanatory variables, the usual linear regression model is not suitable. The Generalized Linear Model (GLM) is an appropriate generalization, which allows for non-normal responses with possibly constrained expectations (for example, greater than zero for a Poisson response). We shall study the theory of the GLM, and apply it to analyze several examples.

Learning outcomes - On successful completion of this module, students should be able to:

Understand and apply the material described under Course/Module Content.

Attendance requirements(%):

0

Teaching arrangement and method of instruction: The instructor will lecture and write (and erase) on the board. There will be many examples of computer output (data sets, results of statistical analyses, etc.) which will be both put on the course's website and projected during the lectures.

Course/Module Content:

1. Introduction

Analysis of a binary response: exploratory analysis, formulation of the logistic regression model, calculation of the MLE, interpretation of parameters.

An example of a Poisson response.

2. General framework

Formulation of the Generalized Linear Model: exponential family of distributions, link functions.

Estimating the parameters: iteratively reweighted least squares, Fisher scoring,

asymptotic distributions.

Examples: probit regression, Poisson regression, Gamma-distributed responses.

Model building: measures of goodness-of-fit, residuals.

Moment-based estimates (quasi-likelihood), overdispersion.

3. An example with dependent observations.

Required Reading:

None.

Additional Reading Material:

Hosmer, DW and Lemeshow, S. (1989), Applied Logistic Regression.

McCullagh, P and Nelder, JA (1989), Generalized Linear Models.

R functions glm, glmm{MASS}.

Venables, WN and Ripley, BD (1994), Modern Applied Statistics with S-Plus.

Course/Module evaluation:

End of year written/oral examination 100 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 0 %

Reports 0 %

Research project 0 %

Quizzes 0 %

Other 0 %

Additional information:

None.