

**Generalized Linear Mixed Models**  
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PhD School, XXIV cycle

## Course Description

This course provides an introduction to Generalized Linear Models (GLM) and its extension to mixed-effects (hierarchical) models. Relevant theoretical results will be reviewed and practical issues arising in modeling complex data (i.e., correlated or clustered data) will be considered.

## Objectives

The objectives of this course are:

- To learn (or review) basic theoretical results about inference for generalized linear and mixed-effects models.
- To understand how to build, fit and interpret GLMMs
- To fit hierarchical models to some real datasets by using R and Bugs.

## Schedule

13	May	10.00-12.00	Introduction to the course: basic ideas (Torelli)
17	May	10.00-12.00	Generalized linear models: structure and inference (Torelli)
26	May	10.00-12.00	Binary, multinomial and count data: some important applications of GLMs (Torelli)
4	June	10.00-12.00	Overdispersion in GLMs (Torelli)
8	June	10.00-12.00	Introduction to hierarchical models and to GLMMs (Torelli)
14	July	10.00-12.00	Likelihood inference in GLMM (Bellio - Udine)
		15.00-17.00	Practical session with R (Bellio)
15	July	10.00-12.00	Bayesian Hierarchical Models (Trevisani- Trieste)
		15.00-17.00	Practical session with R-Bugs (Trevisani)

## Recommended texts

- Bryk A.S., Raudenbush S.W. (2002), *Hierarchical linear Models*, Sage.
- Gelman, A. & Hill J. (2007), *Data Analysis Using Regression and Multilevel/Hierarchical Models*, Cambridge University Press, NY.
- Fahrmeir L., Tutz, G. (2001) *Multivariate Statistical Modelling Based on Generalized Linear Models*, Springer, New York. Chapter 6.
- McCulloch, C.E., Searle, S.R. (2001) *Generalized, Linear and Mixed Models*, J. Wiley, New York.
- Snijders T, Bosker, J, (1999) *Multilevel Analysis*, Sage.

## Final Exam

July, 12 h.10.00