

## Regression Models

Academic Year: ( 2023 / 2024 )

Review date: 11-08-2023

Department assigned to the subject: Statistics Department

Coordinating teacher: DURBAN REGUERA, MARIA LUZ

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 1

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Probability  
Statistical Inference  
Programming in R

## OBJECTIVES

The main course objectives are:

1. Understand and apply linear regression for estimation, inference, and diagnostics.
2. Introduce the concept of Generalized Linear Models (GLMs) with a focus on the Exponential family, and develop skills in estimation, inference, and diagnostics for GLMs.
3. Explore logistic regression, along with Multinomial, Ordinal, and Poisson models.
4. Gain knowledge of Generalized Additive Models (GAMs) and become proficient in smoothing methods, penalized splines, estimation, and the selection of smoothing parameters.

## DESCRIPTION OF CONTENTS: PROGRAMME

Regression Models

- 1) Linear regression: Estimation. Inference. Diagnostics.
- 2) Introduction to Generalized Linear Models: Exponential family. Estimation. Inference. Diagnostics.
- 4) Logistic Regression, Multinomial, Ordinal, Poisson.
- 3) Generalized Additive Models: Smoothing Methods. Penalized Splines. Estimation. Smoothing parameter selection

## LEARNING ACTIVITIES AND METHODOLOGY

Learning activities:

Master classes  
Exercises  
Computer labs  
Projects

Teaching methodologies:

Presentations of the professor in class with computing and visual media, where the professor develops the main concepts of the subject and provides bibliography supplementing the knowledge of students.  
Critical reading of texts recommended by the professor: manuals and/or academic papers, either for their posterior discussion in class, or for widening and consolidating the subject matter.

## ASSESSMENT SYSTEM

Ordinary evaluation:

SE1 Assignments done during the course 40%+ 60% Final exam

Extraordinary evaluation:

Maximum betwee: 60% continuous evaluation+ 40% exam and 100% exam

**% end-of-term-examination:** 50

**% of continuous assessment (assignments, laboratory, practicals...):** 50

#### BASIC BIBLIOGRAPHY

- Annette J. Dobson, Adrian G. Barnett An Introduction to Generalized Linear Models, CRC Press, 2018
- Julian J. Faraway Extending the Linear Model with R: Generalized Linear, Mixed Effects and Nonparametric Regression Models, CRC Press, 2016
- Michael H. Kutner, Chris J. Nachtsheim, John Neter Applied Linear Regression Models, McGraw-Hill Higher Education, 2003
- P. McCullagh, John A. Nelder Generalized Linear Models, CRC Press, 1989
- Simon Wood Generalized Additive Models: An Introduction with R, Chapman & Hall/CRC Texts in Statistical Science, 2017