Advanced Regression Methods

Academic Year: (2023 / 2024)   **Review date: 21-04-2023**

Department assigned to the subject: Statistics Department

Coordinating teacher: DURBAN REGUERA, MARIA LUZ

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)
Statistical inference I
Statistical inference II
Regression methods

OBJECTIVES
-Being able to identify and propose the correct model for a specific problem
-Ability to manage computationally and analiticaly the models proposed and carry out the analysis of the resuts obtained.
-Ability to model and analyze static and dynamic data
-Ability to validate models and interpret the results
-Ability to draw conclusions and write reports
-Ability to work in multidisciplinar groups

DESCRIPTION OF CONTENTS: PROGRAMME
1. Revision of linear models
1.2 Estimation
1.3 Inference

2. Introduction to generalized linear models
2.1 Exponential family
2.2 Components of a GLM
2.3 Estimation: Fisher Scoring Algorithm
2.4 Inference
2.5 Diagnostics

3. Models for binary data and proportions
3.1 Logistic regression
3.2 Parameter interpretation: Odds ratio
3.3 Validation: ROC curve

4. Models for count data
4.1 Poisson regression
4.2 Log-linear models

5. Generalized additive models
5.1 Smoothing techniques
5.2 Estimation and inference

6. Random effects models
6.1 Estimation
6.2 Inference
6.3 Models for repeated measures and longitudinal data

ASSESSMENT SYSTEM

Ordinary examination:

This course will have continuous evaluation consisting of exams and computer labs

The final mark will be a weighted average:
- 60% final exam
- 40% continuous evaluation

In the extraordinary exmination the evaluation system will be the maximum between:

-100% of the exam
-The same system as the ordinary examination

% end-of-term-examination: 60

% of continuous assessment (assigments, laboratory, practicals…):   40

BASIC BIBLIOGRAPHY

 - Dobson, A. An introduction to generalized linear models, Chapman and Hall, 2001

 - Faraway, J. Extending the Linear Model with R: Generalized Linear, Mixed Effects and Nonparametric Regression Models, hapman & Hall/CRC Texts in Statistical Science, 2016
 - McCulloch, C. Generalized, Linear, and Mixed Models, Wiley Series in Probability and Statistics, 2001

BASIC ELECTRONIC RESOURCES

 - Durban, M. . Modelos Multinivel:
http://halweb.uc3m.es/esp/Personal/personas/durban/esp/web/Multinivel/Multinivel.html
 - Durban, M. . Modelos Aditivos Generalizados: http://www.est.uc3m.es/durban/esp/web/cursos/GAMs/GAMs.html