Code: ECO3500000

Course: Statistical Modelling Applied to Ecology

Credits: 02

Total: 30 h

Professors:
Dr. Fábio Gonçalves Daura Jorge

Semester/Year: 2023-2

Period: 02/10/2023, 11/10/2023 (days 02, 04, 06, 09 and 11/10)

Hours: 09:00 to 12:00 and 14:00 to 17:00.

Number of students: 15

Room: To be confirmed

Office hours: professor's room from 17:00 e 18:00.

Pre-requisite: Basic statistic

Syllabus:
General introduction to statistical modelling; Data exploration protocols; Linear regression and limitations; Statistical distributions; Generalized linear modelling; Generalized additive modelling; Generalized least squares regressions; Introduction to mixed modelling; Model selection; Model validation.

Methodology:
The course will address five complementary modules, totaling nine theoretical lectures followed by practical exercises using the free software R. Multiple databases and tutorials will be made available with specific literature to support and motivate students to solve and find solutions for different statistical problems. At the end of the course, students will be encouraged to practice their new statistical skills by working in their own data (when available).

Assessment of students' performance :
Frequency in lectures, participation and involvement in practical activities, presentation of a final project based on a guided exercise.

Program and Schedule:

Day	Time	Professor	Content
02/10	09:00 -12:00	Fábio	Module I: General introduction to statistical modeling
02/10	14:00 - 17:00	Fábio	Module I: Data exploration protocols; Exercise 1
04/10	09:00 -12:00	Fábio	Module II: Linear regression and limitations; Exercise 2
04/10	14:00 - 17:00	Fábio	Module II: Statistical distributions; Exercise 3
06/10	09:00 -12:00	Fábio	Module III: Generalized linear modelling;

			Exercise 4
06/10	14:00 - 17:00	Fábio	Module III: Generalized linear modelling; Exercise 5
09/10	09:00 -12:00	Fábio	Module IV: Generalized additive modelling; Exercise 6
09/10	14:00 - 17:00	Fábio	Module IV: Generalized least squares regressions Exercise 7
11/10	09:00 -12:00	Fábio	Module V: Introduction to mixed modelling
11/10	14:00 - 17:00	Fábio	Module VI: Session on students data

References:

Burnham K.P.; Anderson D.R. 2002. Model Selection and Multimodel Inference: A Practical-Theoretic Approach. Springer-Verlag, USA, 351p.
Bolker B. 2008. Ecological Models and Data in R. Princeton, Princeton University Press, USA, 389p.
Crawley M.J. 2005. Statistic: an introduction using R. Imperial College of London, UK, 337p.
Faraway J. 2006. Extending the linear model with R. Taylor & Francis, UK, 345p.
Faraway J. 2009. Linear models with R. Taylor & Francis, UK, 255p.
Fox J.; Weisenberg S. 2011. An R Companion to Applied Regression. SAGE Publications, USA, 449p.
Hilborn R.; Mangel M. 1997. The Ecological Detective – Confronting Models with Data. Princeton University Press, USA, 309p.
Venables W.N.; Ripley B.D. 1999. Modern Applied Statistics with S. Springer, USA, 495p.
Zuur A. F.; Ieno E. N.; Smith G. M. 2007. Analysing ecological data. Springer, USA, 685p.
Zuur A. F.; Ieno E. N.; Walker N. J.; Saveliev A. A.; Smith G. M. 2009. Mixed Effects Model and Extensions in Ecology with R. Springer, USA, 574p.