



UNIVERSIDADE FEDERAL DE SANTA CATARINA  
CENTRO DE CIÊNCIAS BIOLÓGICAS  
DEPARTAMENTO DE ECOLOGIA E ZOOLOGIA  
PROGRAMA DE PÓS-GRADUAÇÃO EM ECOLOGIA

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**Code:** ECO3500000

**Course:** Statistical Modelling Applied to Ecology

**Credits:** 02

**Total:** 30 h

**Professors:**

Dr. Fábio Gonçalves Daura Jorge

Dr. Alexandre Machado – professor colaborador

**Semester/Year:** 2024-1

**Period:** 07/10/2024 to 18/10/2024 (days 07, 09, 14, 16 e 18/10)

**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
07/10	09:00 -12:00	Fábio	Module I: General introduction to statistical modeling
07/10	14:00 - 17:00	Fábio Alexandre	Module I: Data exploration protocols; Exercise 1
09/10	09:00 -12:00	Fábio Alexandre	Module II: Linear regression and limitations; Exercise 2
09/10	14:00 - 17:00	Fábio Alexandre	Module II: Statistical distributions; Exercise 3
11/10	09:00 -12:00	Fábio Alexandre	Module III: Generalized linear modelling;

14/10	09:00 -12:00	Fábio Alexandre	Module III: Generalized linear modelling; Exercise 5
14/10	14:00 - 16:00	Fábio Alexandre	Module IV: Generalized additive modelling; Exercise 6
16/10	09:00 -12:00	Fábio Alexandre	Module IV: Generalized least squares regressions Exercise 7
16/10	14:00 - 17:00	Fábio Alexandre	Module V: Introduction to mixed modelling
18/10	09:00 -12:00	Fábio Alexandre	Module VI: Session on students data

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### 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.