



## DATA ANALYSIS TOOLS IN ECOLOGY\_2010

Coimbra, 15-26 February, 2010  
[www1.ci.uc.pt/imar/mvs\\_10](http://www1.ci.uc.pt/imar/mvs_10)



**Department of Life Sciences – University of Coimbra**

A post-graduation course aiming to provide updated statistical tools for data analysis in Ecology and Ecotoxicology. The full course is composed by two independent modules targeted not only for scientists and research students (Ph.D and M.Sc), but also for persons involved in data management.

***Module 1 - The use of Generalized Linear Models (GLM) and Generalized Additive Models (GAM) in Ecology (15-19 February)***

***Module 2 – Multivariate statistical tools in Ecology and Ecotoxicology (22-26 February)***

**Coordination:**

José Paulo Sousa, IMAR-CIC, Dep. Life Sciences, University of Coimbra, Portugal  
Rui Ribeiro, IMAR-CIC, Dep. Life Sciences, University of Coimbra, Portugal

**Lecturers:**

***Module 1***

Alain Zuur, Highland Statistics Ltd, Scotland  
Elena Ieno, Highland Statistics Ltd, Scotland

***Module 2***

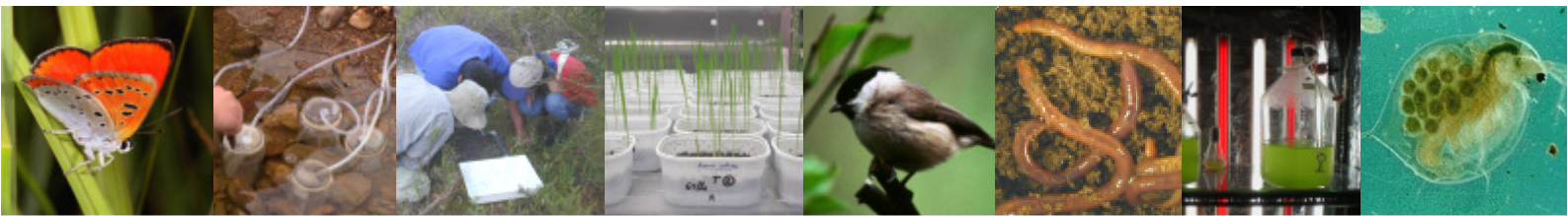
José Paulo Sousa, Dep. Life Sciences, University of Coimbra, Portugal

**Programme:**

The two course modules include both theoretical and practical lectures, including the analyses of several case studies with real data sets given by the lecturers (participants are also encouraged to bring their own data sets).

The first module will be focused on GLM and GAM tools using Brodgar ® software). The second module will be focused on multivariate tools and using the Canoco for Windows ® software.

All lectures are in English



## Topics:

### Module 1

- Data exploration (outliers, transformations)
- Linear regression:
  - Model selection; Defining Interactions between explanatory variables
  - Stepwise regression; Model validation.
- Generalized Linear Models (GLMs):
  - Poisson and Binomial.
- Generalized Additive Models (GAMs):
  - Gaussian, Poisson and Binomial.
- Catching up:
  - Negative Binomial distribution and the Gamma distribution in GLMs and GAMs

### Module 2

- Introduction into Multivariate Analysis and Ordination: response models available and how to choose them
- Representing the underlying structure of a dataset
  - How to choose the best method? Introduction to Gradient Analysis;
  - Principal Component Analysis (PCA) vs. Correspondance Analysis (CA);
  - Non-Metric Multidimensional Scaling (NMDS)
- Relationship between response variables and explanatory variables
  - Direct versus Indirect analysis;
  - Redundancy Analysis (RDA) and Canonical Correspondence Analysis (CCA);
- How to relate quantitative explanatory variables with presence-absence response data?
  - Principal Coordinate Analysis (PCoA) and Distance-based Redundancy Analysis (dbRDA)
  - Non-metric Multidimensional Scaling (NMDS) and Indirect Principal Component Analysis (PCAind)
- Discriminating groups of samples/subjects
  - Discriminant Analysis (DA) and "Analysis of Similarities" (ANOSIM)
- Particular applications
  - Variance decomposition methods
  - Principal Response Curves (PRC).

## Fees:

### Module 1 **PLUS** Module 2

Normal course fee (the two modules) – 650 Euro (includes documentation)

Discount fee (members of ORDEM DOS BIÓLOGOS, SPEA, SPECO, SPEN, SPCS, SICTA and SETAC) – 550 Euro (includes documentation)

### Module 1 **OR** Module 2

Normal course fee (one module) – 500 Euro (includes documentation)

Discount fee (members of ORDEM DOS BIÓLOGOS, SPEA, SPECO, SPEN, SPCS, SICTA and SETAC) – 450 Euro (includes documentation)

## Number of participants:

Limited to 25 participants at each module

Registrations are done online ([www1.ci.uc.pt/imar/mvs\\_09](http://www1.ci.uc.pt/imar/mvs_09))

## Organization:



Instituto do Mar - IMAR  
Universidade de Coimbra



Departamento de Ciências da Vida  
Universidade de Coimbra

## Informations:

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