Code: 1347 **Data Treatment and Experimental Analysis in Ecology**
Degree: 2nd cycle – Natural Resources Management and Conservation
Curricular Year: 1st **Semester Course: 1st**
Credits: 6 ECTS **Compulsory**
Language: Portuguese/English
Responsible: Teresa Paula Gonçalves Cruz (UE)
Other lecturer(s): -
Web Site: http://www.isa.utl.pt/home/node/3871

1. Contact hours:
Lectures 20 **Praticals/Laboratory** 25 **Others** 1 **Total** 56

2. Objectives:

Development of the capacity of identifying the logical components in the research process in ecology.
Development of the capacity of designing, analysing and interpreting experiments in ecology by using univariate and multivariate techniques of analysis.
Development of criticism in order to discuss the adequacy of an experiment to an ecological problem and the interpretation of experimental results.
Development of English and Portuguese skills by reading scientific papers and writing, of numerical and computational ability to analyse data, of the ability to make scientific communications, oral and written, and of using the teaching on-line platform of the university of Évora.
Development of the capacity of working in groups.

3. Programme:

Contents
- Logical concept of experiments: from observations to the interpretation of experiments.
- Common problems in bad-designed experiments: lack of replication; lack of controls; pseudo-replication in space and time; confounding experiments; lack of independence.
Univariate studies
-Control experiments in the laboratory, manipulative and observational studies in the field that integrate spatial and temporal variability in different scales, using analysis of variance (multifactorial ANOVA, orthogonal and nested designs, fixed and random factors).

- Power analysis of a test and use of power to design an experiment.

- Detection of environmental impacts using asymmetrical analyses (“Beyond BACI”).
- Correlation and simple and multiple regression.
Multivariate studies (e.g. patterns of community structure) using:
- Classification and ordination techniques applied to biological and environmental data;
- Tests of multivariate hypotheses;

- Relation between multivariate biological and environmental patterns.

Teaching methods

Theoretical classes followed by practical classes with case studies and using appropriate software.

Practical classes of discussion and presentation of proposals of resolution of ecological problems by designing na experiment (work in groups)

Practical classes of analysis and interpretation of experimental results (bases in scientific papers) (work in groups).
Problem solving in the design and analysis of ecological experiments (homework) and discussion with the teacher by e-mail.

4. Bibliography:

Main Bibliography

Clarke, K.R. & Warwick, R. M., 2001. Change in Marine Communities. An approach to statistical analysis and interpretation. National Environment Research Council, U. K., 144p.

Quinn, G. P. & Keough, M.J., 2002. Experimental design and data analysis for biologists. Cambridge University Press. 537pp.

Underwood, A.J., 1997. Experiments in ecology: their logical design and interpretation using analysis of variance. Cambridge University Press. 504pp.

5. Assessment:

Participation in discussions, presentations and discussion of the work. Individual work in the solving of problems by designing experiments and analysing and discussing experimental results (homework and individual tests)

6. Estimated Workload: 162 Hours

7. Last Update: 9/8/2010