COURSE SYLLABUS

Academic year 2013-2014

1. COURSE DESCRIPTION

Degree:	**Environmental Sciences, University Pablo de Olavide, Seville**
Double Degree:	
Course:	**Sampling Methods in Ecology**
Module:	
Department:	**Physical, Chemical and Natural Systems**
Academic Year:	**2012-2013**
Term:	**Second- Spring**
Total Credits:	**Six**
Year:	**Second**
Type of Course:	**Optional**
Course Language:	**English**

Teaching model:	
a. General/background:	**50%**
b. Theory-into-practice/developmental knowledge-building	**50%**
c. Guided Academic Activities:	**0**

COURSE SYLLABUS

Academic year 2013-2014

2. TEACHING TEAM INFORMATION

2.1. Course coordinator Prof. Dra. María Pérez Fernández

2.2. Teachers	
Name:	**María Pérez Fernández**
Faculty:	**Experimental Sciences**
Departament:	**Physical, Chemical and Natural Systems**
Academic Area:	**Ecology**
Category:	**Associate Professor**
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COURSE SYLLABUS

Academic year 2013-2014

3. ACADEMIC CONTEXT

3.1. Course Description and Objectives

1. The students can relate values of the environmental factors with the abundance and distribution of the living organisms by means using field sampling techniques
2. The students will learn he most common sampling method used in terrestrial Ecology.
3. The students can apply the principles to quantify the abundance of living organisms
4. The students can design and independently complete a field study.
5. The students are able to integrate the experimental evidences found in field and/or laboratory studies with the theoretical knowledge.
6. The students will discover learn the importance of biodiversity and taxonomy, as sources of knowledge by themselves and as base of application for other
7. The students can relate the ecosystem's characteristics and its historic evolution with the degree of maturity of that ecosystem.

3.2. Contribution to the Training Plan

This is an optional unit belonging to the fourth course in the Degree of Environmental Science and requires strong command of environmental issues. It will allow the students to acquire a real view of the fieldwork for what putting into practice a great proportion of the knowledge learnt in the previous courses of the degree will be needed. The student reaches maturity and independence in data collection in the field and in the laboratory as well as in data treatment and interpretation. Finally, the student has to elaborate conclusive and coherent reports meaningful in both the scientific and the environmental management areas.

3.3. Recommendations or Prerequisites

Although Ecology is a coursetaught in the second course of the degree, no prerequisite is required for the students to enrol the course. However, it is advisable that the student

has successfully passed the coursesof Mathematics, Physics, Chemistry, Geology, Biology, and Ecomony of first year; similarly, they have to have passed Flora and Fauna, Microbiology, Metheorology and y Climathology, Hidrology, Pedology and Ecology of second year.

It is also advisable that the student has a reasonable level of English, as part of the bibliography to be used is only available in such language. Students with knowledge of computer science and of statistics will find this subject more accessible than those without them (i.e use of spreadsheet, SPSS or similar statistical programmes, internet searchers).

COURSE SYLLABUS

Academic year 2013-2014

4. SKILLS

4.1 Degree Skills Developed during this Course

After having studied this course, the student will have acquired the following skills::

1. Comprehension of knowledge in the environmental area to a text books and scientific specialized texts level
2. Synthesis and analysis capacities Production and defence of ideas
3. Oral and written communication
4. Environmental problem solving and decision-making.
5. Team work
6. Recognition of the diversity
7.Critical reasoning
8. Ethical commitment
9. Autonomous learning
10. Creativity
11. Aptitude to assemble and interpret relevant information to issue judgments that include a reflection on key topics of social, scientific or ethical nature
12. Motivation for the quality
13. Sensibility towards environmental topics
14. Ability to apply theoretical knowledge to practical cases
15. Capability to discuss environmental aspects with specialists and with non-expert people
16. Development of the needed skills to undertake further studies with a high degree of autonomy.
17. Skilled in the management of the new technologies and innovation

Specific Skills

1. To know and to understand the levels of organization of living organisms
2. To know the relations between the living organisms and the environment.
3. To know and to apply the techniques to estimate and to interpret biodiversity and the ecological succession
4. To acquire basic knowledge on plant biodiversity and phytogeography
5. To know the basic principles of the ecological and environmental economies

6. To understand, in an integrative way, the natural and humanized landscapes, and the interaction between the environment and society.
7. To be able to design and apply indicators of sustainability and ecological fingerprint.
8. To be able to apply the technologies of landscape evaluation in the environmental and territorial ordination.
9. To be able to design samplings campaigns and to be able to interpret information from statistical analyses
10. To understand factors that regulate the ecosystem's development and ecosystems variations

4.2. Module Skills Developed during this Course

After having passed the course, the student will:

1. To know and to understand the main techniques to study fauna, flora and fungi.
2. To know and to understand global plant and fungal diversity with special focus on that of the Iberian Peninsula.
3. To know the most relevant plant formation at global level with special focus on that of the Iberian Peninsula.
4. To be able to apply the most commonly used techniques in plant studies.
5. To show the importance of the biodiversity and taxonomy, as sources of knowledge by themselves and as base for other subjects.
6. To know and to understand the concept of environmental factor as well as the response of living organisms to environmental physical factors.
7. To know and to understand the main types of interactions between living organisms
9. To know and to understand the temporal variation of an ecosystem, as well as the ecosystem's structure and function.
10. To know and to understand the structure and the microbial diversity in contrasting ecosystems.

4.3. Course-specific Skills

The course 'Ecological Sampling Methods' enables the students to be proficient at:

1. Interpreting quantitatively complex systems (ecosystems) after the implementation of sampling methods and technologies.
2. To independently design and establish a field experiment

3. To be able to handle basic instrumentation to conduct field measurements useful in determining the structure and function of ecosystems.
4. To be able to apply statistical tests to experimental complex designs in ecology
5. To be able to plot results obtained from sampling campaigns, to interpret those results and to write a scientific paper of ecological relevance.
6. To be able to select and to use instrumentation and technologies appropriate for fieldwork in the area of Ecology.
7. To design and to organize a field campaign to study the physical environment
8. To be able to treat the data collected the field and to present them as part of a technical report

5. COURSE CONTENT (COURSE TOPICS)

1. Introduction to the methods of sampling of plant and animal populations in terrestrial ecosystems.
2. Sampling quantification.
3. Design and accomplishment of field samplings and /or laboratory experiments.
4. Data treatment, analysis and interpretation.

6. METHODOLOGY AND RESOURCES

The teaching-learning process of this course includes theoretical classes, practical classes, seminars and tutorials.

Each one of the above mentioned methodologies provide methodological orientations that guarantee taking the most of the course content. At the same time, the methodology of this course aims at promoting the development and exercise of both generic and specific skills in Ecology. The theoretical teaching sets the basis on which the students construct their his/her knowledge, as in these theoretical classes the student receives key information without which he/she would not be able to carry out the practical activities.

The theoretical classes include explanations from the instructor, individual readings and study from the students (including the search for extra information), as well as group work in which the students will discuss their doubts. There will also be general class discussion oriented towards the students to practise the speech publicly and the defense of his/her opinions. These theoretical classes are compulsory in the teaching of Ecology, and offers the students a basic and general perspective of the necessary knowledge with which to develop the enire subject.

The practical classes will be used as a complementary procedure to the theoretical lessons in the teaching of the course. Practical classes will represent a syntehsis between theory, experimenttion and a way of checking the students' acquisition of the contents. Thanks to the practical classes. it is possile to reinforce the concepts raised in the theoretical classes and to emphasize the practical application of each of them in different contexts.

The practical classes will be conducted in a cooperative way, in groups of 3 to 4 students each. They will be accompanied by a series of questions that will allow

evaluating the level of comprehension and assimilation of the concepts introduced in the theoretical classes. These include field, laboratory and clreical work. The practical classes require a high level of independence among the students, together with a strong self-responsibility and commitment to the work, as everyone's work is indispensable for the correct and complete development of the group work. Special care has to be taken for an equal participation to take place within the group, in which all the students have to interact simultaneously.

The seminars are useful for the students to demonstrate that they have acquired not only knowledge of the contents, but also the skills to communicate them in a coherent way infront of expert public. The tutorials will serve to settle and solve any problems that might arise along the formative process. During the tutorials, which can be individually conducted or in groups or even at a class level, the students will be able to discuss questions, expand information and to raise new challenges for the audience.

6.1. Study Materials and recommended bibliography

The classes are based on PowerPoint presentations, as well as on the readings of articles related to the subject and on the consultation of manuals and specialized web pages. Each lesson will have a particular distribution, depending on the topic. All the materials that are going to be used in class will be uploaded and at the disposal of the students in the WebCT platform.

In addition, it is advisable that the students consult the basic Bibliography mentioned at the end of this teaching programme. This text selection has been produced according the bibliographical funds already existing at the library at Pablo de Olavide University.

COURSE SYLLABUS

Academic year 2013-2014

7. ASSESSMENT

1. Written tests on the theoretical contents and on practical cases.
2. Written tests and/or reports on the laboratory and field work as well as on the technical visits performed.
3. Evaluation of the final project. This includes two parts (i) the written report (50%) and (ii) the presentation in class (50%).
4. The theoretical, the practical and the seminar parts of the course need to be passed with a minimum of 5 out of 10. Once all parts are passed, the final grade will be calculated as average of the three of them.

The following chart shows the percentages given to each item and the instrument of evaluation.

ITEM	CRITERIA	INSTRUMENT	VALUE
Theory	-Command of theoretical knowledge	Theoretical exam	40 %
Practicals	- Correct and coherent design of field samplings. -Aptitude to propose working hypothesis and to plan the study to accept or to reject the proposed hypotheses. - Correct data obtaining and data processing. - Production of coherent conclusions - Work's quality (aptitude to recognize importance of contents)	Constant follow-up on check on the intermediate reports of the Practicals Delivery of the Final Report of Practical ---------- There will be an exam on the practicals for those students who did not attend the practical classes (that includes the field trip). Class attendance and tutorials are compulsory	40 %
Seminars	-Oral and written communication skills.	Presentation of projects in class	20 %

Students retaking the exam in July will need to complete the evaluation test for the entire course or for that part that had not been passed in the June call. In all cases, it is mandatory to obtain a minimum grade of 5 out of 10 in each part or the exam (theoretical and practical). From then on, the final grade will be calculated as average of the grades obtained in the theoretical and practical parts of the exam.

The theory exam will include a multiple choice test (50% of the final grade in the theoretical part) and 2 to 5 questions for the students to describe techniques and procedures and to solve ecological problems (50% of the grade in the theoretical part).

The practical part of the exam will consist on short questions and practical examples or study cases. All together will count as 100 % of the grade in the practical part.

8. BIBLIOGRAPHY

Begon, M., Harper, J.L. y Townsend, C.R. 1988. Ecología. Individuos, poblaciones y comunidades. Omega, Barcelona.

*Brower, J.E., Zar, J.H., von Ende, C.N., 1998. Field and laboratory methods for general ecology. McGraw-Hill, Boston, MA

Hulbert, S.H., 1984. Pseudoreplication and the design of ecological field experiments. *Ecological Monographs* 54:187-211.

Margalef, R. 1982. Ecología. Omega, Barcelona.

* Manly, B.F.J., 1992. The design and analysis of research studies. Cambridge University Press, UK

*Mostacedo, B. y Todd, S.F. 2000. Manual de Métodos Básicos de Muestreo y Análisis en Ecología Vegetal. BOLFOR, Santa Cruz de la Sierra.

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

***** Most relevant readings