

Ecology

Code: 106778
ECTS Credits: 6

2024/2025

Degree	Type	Year
2504604 Environmental Sciences	OB	2

Contact

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Teaching groups languages

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Prerequisites

There are no official prerequisites. However, being a subject with transversal content, it would be desirable to have passed most of the previous subjects.

Objectives and Contextualisation

The aim of this subject is to provide the basic knowledge of ecology for a graduate in environmental sciences. This biological discipline is fundamental to understanding the interaction between man and the environment, which, after all, is the key objective of Environmental Science studies. Although the focus is on basic science, the aim will be to show the usefulness of the ecological concepts being studied. The subject places special emphasis on the quantitative aspects of ecology, so that the student will find it necessary to use the mathematical and statistical tools studied in previous subjects of the degree.

Learning Outcomes

1. KM52 (Knowledge) Identify the basic aspects that play a role in the dynamics and relationships between biological populations within natural system management.
2. SM49 (Skill) Establish appropriate relationships between the flows of physical (energy, matter, etc.) and biological origin that take place in ecosystems.
3. SM51 (Skill) Safely use techniques and instruments for the analysis of biological samples in the field and/or laboratory.

Content

Part I. Organisms and populations

1. Introduction. Ecology in the context of environmental sciences. The need for a quantitative approach. Man in nature. Are we close to ecological collapse?

2. Ecology and evolution. Evolution by natural selection. Local adaptation. Speciation. Historical factors in the distribution of species.
3. Response of organisms to the environment. Environmental conditions and resources. Temperature. Plants and water. Distribution area, habitat and ecological niche. Form, size and function.
4. Basic demographic processes in populations. Unlimited growth and density-regulated growth. Exploitation of populations.
5. Structured populations. Life histories. Exponential growth in structured populations.
6. Populations in space. Local populations and metapopulations. Local and regional extinction. Colonization. Conservation of populations.
7. Interactions between species. Competition, predation and mutualism. Indirect effects.

Part II. Communities and Ecosystems

8. Composition and structure of communities. Diversity and biodiversity. Measurement of biodiversity. eDNA Ecological networks. Key species. Biomes.
9. The incessant change: succession and disturbance. Models of succession. Hypothesis of the intermediate disturbance.
10. Communities in space: biogeography. Communities and metacommunities. Species-area relationship. McArthur and Wilson 's model of island biogeography.
11. Conservation of biodiversity. Extinctions in the past. The current great extinction. Causes of biodiversity loss. Main biodiversity conservation strategies.
10. What are ecosystems? Matter and energy. Structure of terrestrial and aquatic ecosystems. Compartment and flux models.
11. Energy flow in ecosystems. Primary production. New production and recycled production. Secondary production. Herbivores and detritivores.
12. Flux of matter in ecosystems. The hydrological cycle. Nutrient cycles in aquatic and terrestrial ecosystems.
13. Global ecology. The main biogeochemical cycles in the Biosphere. Alterations: eutrophication, acid rain, global change. The Gaia hypothesis.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classroom numerical problems lab	12	0.48	
Computer lab	6	0.24	
Field work	6	0.24	
Lectures	24	0.96	
Type: Supervised			
Tutorials	4	0.16	

Type: Autonomous

Preparation and presentation of essays	32	1.28
Self study	62	2.48

The teaching methodology combines the following learning activities:

(a) master classes (whole group) in which the theoretical bases of ecology are presented.

(b) classroom practices (in groups) in which different activities will be carried out: (1) solving numerical problems that help to illustrate and consolidate the concepts seen in the theory classes; and (2) the presentation and follow-up of case studies or debates corresponding to different content blocks.

(c) computer practices (in four groups) in which two activities will be carried out: (1) solving complex numerical problems that require the use of a computer; and (2) the analysis and discussion of the data collected in the field practices.

(d) field practices (in four groups) in which an outing will be carried out to study the production and biomass of a Mediterranean forest.

(e) tutorials aimed at resolving doubts and guiding students beyond specific classroom practice sessions. The schedule of individual tutoring will be specified with the teachers through the virtual campus.

Most of the materials covered in activities (a), (b) and (c) can be followed with the textbook *Ecología con números* available in electronic format at the DDD of the UAB (<http://ddd.uab.cat/record/225887>). The book is particularly suitable for solving numerical problems, which form the core of the subject. At the beginning of the course, it will be indicated which parts of the book are compulsory study, regardless of whether they are covered in face-to-face classes. The rest of the subject material will be available on the virtual campus.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of study cases in the classroom	10	0	0	
Evaluation of the computer lab	10	0	0	
Evaluation of the field work	20	0	0	SM51
First partial exam	30	2	0.08	KM52, SM49
Second exam	30	2	0.08	KM52, SM49

The evaluation of the subject includes:

- First partial exam: Individual; 30% of the grade (part I of the contents)

- Second partial exam: Individual; 30% of the grade (part II of the contents)
- Evaluation of case studies in classroom practices: 10% of the grade
- Evaluation of computer practice: 10% of the grade
- Evaluation of field practices: 20% of the grade

The final grade of the subject (F) is calculated as the average weighted by the indicated percentages of the previous grades. To pass the subject, F must be greater than or equal to 5; it is also necessary that the grade of the first partial exam be greater than or equal to 4 and that of the second partial exam be greater than or equal to 4.

Attendance at field practices, computer practices and classroom group discussions are mandatory. Non-attendance without a justified reason leads to a grade of 0 in the corresponding activity.

It will be considered that a student will obtain the qualification of "Not Assessable" if does not present the works (case studies in the classroom practices, computer practice and field practices), and/or does not present any partial exams.

Second-chance exam. In order to participate in the recovery, students must have previously been assessed in a set of activities whose weight is equivalent to a minimum of two-thirds of the subject's total grade. If the grade for one of the partial exams is lower than 4, there is the possibility of taking a make-up exam in January to recover one or more partials. Passed students ($F > 5$), if they wish, can also recover the partials to raise their grade. By taking this exam or make-up exams, the grade obtained previously is waived.

SINGLE ASSESSMENT. Those who have opted for the single assessment method must take a final test divided into three parts.

FIRST (30% of the final grade): A theory exam with topics, short questions and test-type questions. A minimum grade of 4 is required.

SECOND (30% of the final grade): A problem test where you will have to solve a series of exercises like those worked on in the classroom practice sessions. A minimum grade of 3 is required.

THIRD (20% of the final grade): A computer exam on the contents of the field practice (if you have attended the field trip; otherwise, the grade is zero).

The grade will be the weighted average of the three previous activities. The case studies in classroom practice and computer practice are not part of the single assessment, so they will have had to be done like the rest of the students, in a group; this part corresponds to 20% of the final mark.

If the final grade is less than 5, the student has another opportunity to pass the subject through the remedial exam that will be held on the date set by the degree coordinator. The case studies in the classroom practice and the computer practice are not recoverable.

Bibliography

Begon ME, Townsend CR (2021) *Ecology. From individuals to ecosystems*. (5th ed.) Wiley-Blackwell, Oxford.

Gotelli NJ (2008) *A primer of ecology* (4th ed). Sinauer Associates. Sunderland, Massachusetts, USA.

Levin SA, ed. (2009) *The Princeton guide to Ecology*. Princeton University Press, Princeton & Oxford. (advanced)

Margalef R (1974) *Ecología* (2^a ed). Omega, Barcelona.

Piñol J, Martínez-Vilalta J (2006) *Ecología con números. Problemas y ejercicios de simulación*. Lynx, Bellaterra (Barcelona). (còpia electrònica a <http://ddd.uab.cat/record/225887>)

Ricklefs RE, Relyea R (2018) *Ecology: the economy of nature* (8th ed). Freeman, New York.

Townsend CR, Harper JL, Begon M (2014) *Essentials of Ecology* (4th ed). Blackwell Science, Oxford. (ebook)

Software

Simulation programs of the book *Ecología con Números*. Available at <http://ddd.uab.cat/record/225887>

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan/Spanish	first semester	morning-mixed
(PAUL) Classroom practices	2	Catalan/Spanish	first semester	morning-mixed
(PCAM) Field practices	1	Catalan/Spanish	first semester	morning-mixed
(PCAM) Field practices	2	Catalan/Spanish	first semester	morning-mixed
(PCAM) Field practices	3	Catalan/Spanish	first semester	morning-mixed
(PCAM) Field practices	4	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	1	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	2	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	3	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	4	Catalan/Spanish	first semester	afternoon
(TE) Theory	1	Catalan	first semester	morning-mixed