Ecology

Code: 100988
ECTS Credits: 6

2025/2026

Degree	Type	Year
Microbiology	FB	2

Contact

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

Although there are no official prerequisites, it is advisable for the student to have completed the optional subjects

Objectives and Contextualisation

This is a second course subject that introduces the student to the most basic concepts, methods and applications of ecology. It also applies these principles to studies of specific cases with particular social relevance such as epidemiology, biological control or global change. It places special emphasis on the relationships between organisms with the physical environment, the structure and dynamics of populations and communities, and the transfer of matter and energy within communities and ecosystems.

In the same course, the student integrates these basic knowledge with a specific vision of the ecology of microorganisms to the compulsory subject of Microbial Ecology. The contents and competences of the subject of Ecology are also related to those taught in the compulsory subjects of Plant Biology and Animal Biology, and of Environmental Microbiology, as well as with the optative Edaphology and Applied Vegetable Physiology.

The main objective of the course is to provide basic training for the study of the structure and functioning of natural systems at various levels of organization:

1. Organisms: forming the student in the basic concepts related to autoecology, that is to say, the relation of living beings to the environment, providing the basic knowledge of the formalization of the environmental parameters for their ecological analysis.

2. Populations: forming the student in the concept of population and their meanings, and introducing it into techniques for assessing the abundance of organisms, and monitoring and modeling the dynamics of populations.

3. Communities: teaching the student to evaluate the structure of communities, the functional relationships between species (interspecific competition, depredation, symbiosis) and their community-level manifestations (trophic networks); and to analyze its dynamics in time (succession and disturbances).

4. Ecosystems: Introducing the student to the general characteristics of the environment that are relevant to understanding the exchanges of matter and energy in the trophic networks, as a necessary step for the study of biogeochemical cycles.

Learning Outcomes

1. CM05 (Competence) Evaluate the global dynamics of natural systems at different scales of analysis to provide innovative responses to societal demands and care for the environment.
2. CM06 (Competence) Integrate knowledge and skills from the field of biology, working individually and in groups, to prepare and present in writing or orally and publicly a scientific work.
3. KM09 (Knowledge) Describe the taxonomic, morphological and anatomical diversity of the main groups of living organisms and their position within ecosystems.
4. SM08 (Skill) Interpret the bases of evolution and its relationship with the structure and operation of biological systems at all levels of organization.

Content

Part I. Organisms and populations

1. Introduction to ecology. Ecology and evolution
Definitions and development of ecology science. Scientific method. Darwin and Wallace theory of natural selection. Variability, natural selection and fitness. Adaptation: geographical and ecological perspective. Evolutionary bases of adaptation. Adaptive peaks. Coevolution and speciation.

2. Answering organisms to environmental factors
Types of responses to environmental factors. Conditions: responses of organisms at temperature. Resources: plant responses to the availability of light and water. Environment, habitat, distribution area and biomes. Concept of ecological niche: fundamental niche and real niche. Factors that determine the distribution of species.

3. Biological cycles and basic demographic parameters and processes
Unitary and modular organizations. Biological cycles. Reproductive effort and reproduction frequency. Methods for estimating population size.

4. Population dynamics models
Demographics and population dynamics. Basic demographic processes: birth rate, mortality, emigration and immigration. Exponential growth model. Effects of density on organisms and load capacity. Logistic growth model. The interpretation of r and K and ecological and evolutionary implications.

5. Structured population models
Age structure of a population. Age pyramids, life tables and survival curves. Dynamic and static living tables. Survival parameters, net rate of reproduction, generation time. Projection of population size: Leslie and Lefkovitch matrices. Populations in space. Metapopulation models.

6. Interactions between species
Ecological interactions. Interspecific competence. Lotka and Volterra model for competition. Principle of competitive exclusion and displacement of characters. Predation. Ecological and evolutionary effects of predation. Parasites and parasitoids. Hosts as habitats. Evolutionof the host-parasite system. Dynamics of the populations of parasites and hosts. Infection, basic reproductive rate and transmission threshold. Mutualism. Types of mutualisms. Simbiosis. Mutual networks.

Part II. Communities and ecosystems

7. Organization and structure of communities.
Definitions and approaches in the study of communities. Composition and structure of communities. Concept of biodiversity. Alpha, beta and gamma diversity. Diversity indices. Distributions of abundance. Communities in space: species-area relationship and island biogeography. Factors that determine diversity in communities.

8. Dynamics of communities
Communities in time: succession and disturbance. Primary and secondary succession. Hypothesis of succession and climax. Mechanisms of succession. Patterns in succession. Predictive models of succession. Stability, resilience and alternative stable states.

9. Trophic Networks
Chains and trophic networks. Trophic levels. Characteristics of trophic networks. Trophic interactions: direct and indirect effects. Trophic waterfalls. Gremis and key species. Descending and ascending regulation of communities. Applications.

10. Ecology of ecosystems and global change
General functioning of ecosystems. Primary production. Models of compartments and flows. Secondary production and decomposition. Energy transfer in ecosystems. Biogeochemical cycles in terrestrial and aquatic ecosystems. Global change. Global warming. Great acceleration and ecological crisis.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Class activities	6	0.24	CM05, CM06, CM05
Problem solving classes	10	0.4	CM06, KM09, SM08, CM06
Theory classes	29	1.16	CM05, KM09, SM08, CM05
Type: Supervised			
Meetings	5	0.2	CM05, CM06, KM09, SM08, CM05
Supervised exercises	34	1.36	CM05, CM06, CM05
Type: Autonomous			
Study	45	1.8	CM05, CM06, KM09, SM08, CM05
Text reading	15	0.6	CM05, CM06, CM05

Theory class: The fundamental contents of the subject will be explained, emphasizing those of more difficult comprehension for the student. The basic material of the presentations made by the teacher will be provided.

These classes are complementary to the student's activity based on reading and studying textbooks.

Problem classes: Numerical resolution of problems related to the contents of some topics. They may involve the complete resolution of problems in the classroom or the correction of problems previously proposed to students.

Classroom practices: they will be based on case studies of transversal themes and with social repercussion in which the fundamental concepts of the subject are applied. The material student will be provided on which a discussion process will be established in the classroom.

Supervised exercises: a series of exercises will be proposed, which can be numerical, reasoning, graphic representation, etc., to be solved individually or in groups. The student will be provided with the basic instructions and information necessary for their resolution, stimulating and valuing the student's creativity and ability to research at the same time. In case the exercises are evaluable, they must be delivered promptly within the established deadlines and must be edited properly.

Tutorials: The tutorials will be carried out at scheduled hours in the offices of the teachers of the subject (C5b-118, C5b-058). If the development of the subject, and particularly the exercises, requires it, a part of the tutorials can be done in the classroom in hours and location to be specified.

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
Exam	70%	6	0.24	CM05, KM09, SM08
Problems and exercices	30%	0	0	CM05, CM06

- The evaluation of the subject is obtained from 2 grades:

(a) Theory grade, obtained from the average of the marks of 2 partial exams corresponding to the two parts of the syllabus, and eventually from their recoveries. Weight 70% of the final grade, 35% each partial exam.

(b) Assignments grades, obtained from the works commissioned during the semester or from evaluable activities carried out during the theoretical classes. Each activity can have a different weight in the grade. Weight 30% of the final grade.

- If the theory mark is greater than or equal to 4 it is weighted with the problem mark to calculate the "total mark", according to the relation: Theory 70%, Problems 30%. The subject is passed if a total grade equal to or greater than 5 is obtained.

- If the total grade is less than 5 or if the theory grade is less than 4, the partial exams with a grade less than 4 can be recovered on the date set by the recovery exam (only the partial / s suspended must be recovered). This test will not be used to raise the grade of the students who have a total grade s 5, or who have passed the two partials.

- To participate in the recovery, students must have been previously evaluated in a set of activities whose weight is equivalent to a minimum of two thirds of the total grade of the subject or module. Therefore, students

will obtain the qualification of "Not Evaluable" when the evaluation activities carried out have a weighting of less than 67% in the final grade.

- The recovery test will be the same style as the partial tests (described below). The grade in the recovery test will have to be higher than 4 to compute an average with the rest of the tests.

- The mark of classroom practices is not recovered, so if the total grade is less than 5 despite having passed the theory grade, the subject will be suspended.

- Exams may include different types of questions:

Test questions
Short answer questions aimed at assessing whether the key conceptual objectives have been achieved.
Problems or exercises with numerical calculation, aimed at evaluating the achievement of methodological objectives.
Questions that involve a complex answer with the development of a topic or the approach of a hypothesis. The aim is to assess whether the student is able to explain and relate complex processes or concepts.

- The exams have a special weight in the evaluation since it is the only individual evaluation activity controlled by the teacher. For this reason, it is considered that the student will have to obtain in each of the exams (that is, the two partials) a grade greater than or equal to 4 in order to calculate the average of theory. Therefore, partial exams that do not reach 4 will have to be recovered.

Unique evaluation

The single evaluation consists of a single synthesis test in which the contents of the entire program of theory of the subject will be evaluated. The test will consist of questions of the same type as the continuous evaluation exam. The mark obtained in this synthesis test will account for 70% of the final grade of the subject.

The evaluation of the rest of the activities will follow the same process of the continuous evaluation. The grade obtained will account for 30% of the final grade of the subject.

In the case of deliveries or works, the same procedure will be followed as in the continuous evaluation. Students who attend the single assessment may submit all the evidences together on the same day as the one set for the synthesis test. The single assessment test will be done coinciding with the same date set for the last continuous assessment test and the same recovery system will be applied as for the continuous evaluation.

Use of artificial intelligence (IA)

For this subject, the use of Artificial Intelligence (AI) technologies is allowed exclusively in tasks of support for the search for information, the correction of texts or translations. Any content generated by AI must be reviewed by the students and their contributions must be included. The detection of content generated by AI directly included in an academic work may lead to a penalty in the grade of the activity.

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Software

No special software needed

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	721	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	722	Catalan	first semester	morning-mixed
(TE) Theory	72	Catalan	first semester	afternoon