

## Syllabus

### Subject

<b>Subject / Group</b>	20124 - Populations and the Physical Environment / 1
<b>Degree</b>	Degree in Biology - Third year
<b>Credits</b>	6
<b>Period</b>	Second semester
<b>Language of instruction</b>	English

### Professors

Lecturers	Office hours for students					
	Starting time	Finishing time	Day	Start date	End date	Office / Building
Samuel Piña Fernández <a href="mailto:s.pinya@uib.es">s.pinya@uib.es</a>						You need to book a date with the professor in order to attend a tutoring session.

### Context

The subject Populations and the Physical Environment is integrated into the module of Ecology and Global Ecology within the syllabus of the Degree of Biology of the University of the Balearic Islands.

Training in ecology and environmental management is essential for anyone who wants to be graduated in Biology, while opening a wide range of work possibilities, as it is included into one of the sectors with the highest demand for employment and with a great diversity of possible jobs.

The subject Population and Physical Environment develops the first level of organization of matter, superior to the individual. It has a fundamental generic objective: the contribution to achieve the competences foreseen in the syllabus of the Degree of Biology, and specific objectives that are the introduction in the ecological science and the establishment of the bases to attend the subjects of the last course of the Degree.

### Requirements

There is any previous requirement to assist to the subject Populations and the Physical Environment

### Recommended

Given the nature of the subject and the entire module in which it is included, it is necessary to have passed the basic training subjects and, likewise, it is highly recommended to have taken advantage of all the compulsory subjects that appear between the second year and the first semester of the third year.

### Skills

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### Specific

- \* The ability to incorporate a multi-disciplinary vision in life processes and mechanisms, from molecular and cellular studies to organisms and ecosystems. .
- \* Obtaining and integrating suitable lines of evidence to formulate hypotheses in the area of biology, knowing and applying scientific methodology. .
- \* Having the ability to analyse and interpret data in the area of organism and system biology linked to theoretical fundamentals. .
- \* Having the ability to critically and knowingly interpret and communicate biological research information based on data, texts, scientific articles and reports. .

### Generic

- \* Developing skills in analysis, synthesis, organisation and planning, as well as problem-solving in the area of biology. .
- \* Having the ability to work with biological samples in a contextualised way and performing laboratory duties safely, both independently and as part of a team. .

### Basic

- \* You may consult the basic competencies students will have to achieve by the end of the degree at the following address: <http://www.uib.eu/study/grau/Basic-Competences-In-Bachelors-Degree-Studies/>

## Content

The subject Population and Physical Environment is the first approach to the contents of ecology as a biological science and its implications at the planetary level. This means introducing a specific terminology and establishing the connections with the two subjects of the fourth year; The three integrate a common block of the syllabus, the Ecology and Global Ecology module.

The contents of the subject Population and Physical Environment are essential to be able to take the other two subjects of the module, since they constitute the foundations on which those are built. The themes follow a clearly defined sequence. The first three are introductory and delimit the scope of the subject; The first two are applicable to the entire module, the third one is more specific to this subject. The following two topics include content related to the physical environment. They follow three subjects dedicated to the populations from a descriptive and dynamic point of view. Below you will find three other subjects with the own contents of the relationships that are established between different populations.

Finally, the last block is a synthesis that serves as a summary of the contents of the subject while establishing the pertinent connections with the fourth year subject Communities and ecosystems.

### Range of topics

#### Block I. Introduction

##### Theme 1. Ecology and its field of study

- \* Concept of Ecology. Different points of view
- \* A brief historical vision
- \* Ecology and the Systems theory
- \* Ecological systems
- \* The field of Ecology.
- \* Objects of study and objectives

##### Theme 2. The Environment. Basic concepts

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- \* Environmental factors, groups, types and examples
- \* Conditions and resources
- \* Environment, habitat and niche
- \* Aquatic environment and Terrestrial environment

### Block II. Relations between physical environment and organisms

#### Theme 3. Environment and organisms

- \* Interactions
- \* Environment and species selection
- \* The tolerance law
- \* The minimum law
- \* Evolution and ecotypes. Adaptations to the environment: Types and examples

#### Theme 4. The conditions of the Environment

- \* Climatic conditions
- \* Radiation. The role of the atmosphere
- \* Water and humidity. Water availability. Hydric balance.
- \* Relations with temperature
- \* Substrate characteristics

#### Theme 5. Energetic and material resources

- \* Energetic resources and transformations
- \* Material resources. Groups.
- \* Biogeochemical cycles

### Block III. Populations and its dynamics

#### Theme 6. Individual identification methods

- \* Conventional identification methods
- \* Non invasive identification methods
- \* Tag-lossing and problems with marking techniques

#### Theme 7. Ecological populations and its description

- \* Populations and meta-populations
- \* Parameters that define the populations
- \* Population abundance. Estimating ecological populations.
- \* Density. Ways of expression and its interest.

#### Theme 8. Populations dynamics

- \* Main parameters
- \* Birthrate. Ways of expression. Ecological behaviour of birthrate.
- \* Mortality and survival. Life tables.
- \* Population structure

#### Theme 9. Population growth and its regulation

- \* Populations growth
- \* Types of population growth and its implications
- \* The logistic equation and the significance
- \* Populations regulation
- \* Types of regulatory factors. Independent and dependent density factors
- \* Mechanisms of action of the regulatory factors.

### Block IV. Population interactions

#### Theme 10. Interspecific interactions

- \* Classification criteria.
- \* The interactions with 0. Problems. Amensalism and Comensalism.
- \* Narrow interspecific interactions (symbiosi). Concept and types.
- \* Mutualism. Different points of view. Types and examples.

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- \* Mutualism and interactuant population dynamics. Ecological implications of the mutualism.
- \* Parasitism. Types and examples.
- \* Parasites and pathogens.

### Theme 11. Competence

- \* Definitiry characteristics. Types.
- \* The Lotka-Volterra model.
- \* Prediction of the model and the real situation.
- \* The niche theory. Basic concepts.
- \* The ecological strategies.
- \* Teh ecological segregation.

### Theme 12. Exploitation

- \* Types and examples.
- \* The Lotka-Volterra model. Implications.
- \* Capture strategies.
- \* Evolution strategies and consumers diversity.
- \* Defense mecanisms. Types. Convergent solutions.

### Block V. Synthesis

#### Theme 13. Temporal and spatial projection of the interespecific interactions

- \* Coevolution of the interacting populations.
- \* Mutualism. Origin and evolution. Maintainace of the mutualistic relations.
- \* Competence. The Red Queen theory.
- \* Predator-Prey systems.
- \* Incidence of the relation among species on the community structure and the structure and dynamics of the ecosystem.

## Teaching methodology

### Workload

Here it can be found the time for the subject according the kind of activities the student will develop.

### In-class work activities (2.4 credits, 60 hours)

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Participatory classes	Large group (G)	Presentation of the basic contents of the subject and establishment of procedures and fundamental conclusions. They will be developed with the active participation of the large group	15
Theory classes	Oral communications	Large group (G)	It is a specific part of classroom activities. It will consist of an oral communication (by each of the groups) in front of the rest of the class of a subject, prepared by individual and group autonomous work, under the advice of the teaching staff.	30
Practical classes	Problem solving and workshops	Medium group (M)	Activities aimed at establishing the connections between the theoretical contents and their application in the resolution of problems and practical cases. They are mandatory classroom	12

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Modality	Name	Typ. Grp.	Description	Hours
			activities. The contents developed in these activities will be evaluated in the exams, as well as in an internship report.	
Assessment	Examinations	Large group (G)	Control and final exam to be performed on the dates specified in the schedule, strictly respecting the allotted time.	3

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Aula Digital platform.

### Distance education tasks (3.6 credits, 90 hours)

Modality	Name	Description	Hours
Individual self-study	Theoretical classes	A portion of the time allocated to non-classroom activities will have to be devoted to autonomous work. The objective is the proper assimilation and understanding of the basic principles and theoretical foundations linked to content and activities undertaken.	40
Group self-study	Research task	Time required to perform the assigned thematic work. It must result in the preparation of an oral communication and a document to be delivered to the teaching staff. The date of the oral communication will be provided by the teacher at the beginning of the course.	25
Group or individual self-study	Practical classes	After the completion of the field trip and the associated practices, the students must make a report. The contents of this report will be indicated at the beginning of the course.	25

### Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

### Student learning assessment

Here it is found the percentatge that each evaluation item has.

### Frau en elements d'avaluació

In accordance with article 33 of Academic regulations, "regardless of the disciplinary procedure that may be followed against the offending student, the demonstrably fraudulent performance of any of the evaluation elements included in the teaching guides of the subjects will lead, at the discretion of the teacher, a undervaluation in the qualification that may involve the qualification of "suspense 0" in the annual evaluation of the subject".

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### Oral communications

Modality	Theory classes
Technique	Self-assessment systems ( <b>non-retrievable</b> )
Description	It is a specific part of classroom activities. It will consist of an oral communication (by each of the groups) in front of the rest of the class of a subject, prepared by individual and group autonomous work, under the advice of the teaching staff.
Assessment criteria	The evaluation criteria will consider the quality of the work done through the content exposed and referred to oral communication, as well as the structuring and coordination among the different parties. On the other hand, the assimilation and understanding of the contents will be considered, the ability to argue and defend the proposals and questions.

Final grade percentage: 25%with a minimum grade of 5

### Problem solving and workshops

Modality	Practical classes
Technique	Oral tests ( <b>non-retrievable</b> )
Description	Activities aimed at establishing the connections between the theoretical contents and their application in the resolution of problems and practical cases. They are mandatory classroom activities. The contents developed in these activities will be evaluated in the exams, as well as in an internship report.
Assessment criteria	Deliver on time and appropriate form of practice reports.

Final grade percentage: 25%with a minimum grade of 5

### Examinations

Modality	Assessment
Technique	Objective tests ( <b>retrievable</b> )
Description	Control and final exam to be performed on the dates specified in the schedule, strictly respecting the allotted time.
Assessment criteria	Assimilation and comprehension of the contents of the subject, the aptitude to argue and defend a certain point of view or a chosen option, the written expression and the correct structuring of the points treated. The June examination will be worth two-thirds of the total allocated, the remaining third corresponds to the partial control set in the agenda. The July recovery examination represents the total weight assigned to this activity

Final grade percentage: 50%with a minimum grade of 4.5

### Resources, bibliography and additional documentation

Here there is the basic and complementary literature related with the subject.

#### Basic bibliography

- \* Molles, M.C. 2010.Ecología. Conceptos y aplicaciones. McGraw-Hill?Interamericana. Madrid.
- \* Smith, R.L. & Smith, T.M. 2007.Ecología. 6<sup>a</sup> ed. Addison Wesley-Pearson Educación. Madrid.
- \* Odum, E.P. & Warret G.W. 2008.Fundamentos de Ecología. 5<sup>a</sup> ed. Thomson-Paraninfo. Madrid.
- \* Mackenzie, A.; Ball, A.S. & Virdee, S.R. 2001.Instant notes in Ecology. 2nd ed. Taylor & Francis. Oxford.

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### Complementary bibliography

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- \* Begon, M., Harper, J.R. & Townsend, C.R. 1999. *Ecología. Individuos, poblaciones y comunidades*. Omega. Barcelona
- \* Chapman, J.L. & Reiss, M.J. 1999. *Ecology. Principles and Applications*. Cambridge University Press. Cambridge.
- \* Dajoz, R. 2002. *Tratado de Ecología*. 2ª ed. Mundi-Prensa. Madrid.
- \* Díaz Pineda, F. 1989. *Ecología I. Ambiente físico y organismos vivos*. Síntesis. Madrid.
- \* Krebs, C.J. 2009. *Ecology: The Experimental Analysis of Distribution and Abundance*. 6th edition. Benjamin Cummings-Pearson. Menlo Park, San Francisco, CA. [Hi ha una traducció al castellà de la 3ª edició: 1985. C.J. Krebs. *Ecología. Análisis experimental de la distribución y abundancia*. Pirámide. Madrid.]
- \* Margalef, R. 1992. *Planeta azul, planeta verde*. Prensa Científica. Barcelona.
- \* Margalef, R. 2004. *Ecología*. Ed. Omega. Barcelona.
- \* Ricklefs, R.E. 1998. *Invitación a la ecología. La economía de la naturaleza*. 4ª ed. Ed. Panamericana. Madrid.
- \* Rodríguez, J. 2010. *Ecología*. 2ª ed. Ed. Pirámide. Madrid.
- \* Samo, A.; Garmendia, A. & Delgado, J. A. 2008. *Introducción práctica a la Ecología*. Addison Wesley-Pearson Educación. Madrid.
- \* Smith, T.M. & Smith, R.L. 2009. *Elements of Ecology*. 7th ed. Benjamin Cummings-Pearson. Menlo Park, San Francisco. CA.
- \* Townsend, C.R.; Begon, M. & Harper, J.L. 2008. *Essentials of Ecology*. 3th ed. Blackwell. Oxford

