Universidad de Alcalá

TEACHING GUIDE

SUBJECT:

ECOLOGY

Degree in Biology
Universidad de Alcalá

Academic Year 2026/2027

2nd Year (1st and 2nd Quarters)

Aprobada en Junta de Facultad 13/05/2026

TEACHING GUIDE

Name of subject:	ECOLOGY
Code number:	650012
Degree course on which the subject is taught:	DEGREE IN BIOLOGY
Department and Area of Knowledge	LIFE SCIENCES / AREA OF ECOLOGY
Category:	COMPULSORY
ECTS Credits:	12
Year / Period:	Second / 1st and 2nd quarters
Teaching staff:	Óscar Sanisidro Morant (Coordinador) Sara Villén Pérez Aurelio Malo Valenzuela Ignacio Morales Castilla
Tutorial Timetable:	Shown on the Online Campus web of the subject
Language in which the subject is taught:	English

1. PRESENTATION

The aim of this course is to present the theoretical concepts that conform the discipline of Ecology. At a population level the course includes the dynamics of populations, the relationships between organisms and their environment, the process of adaptation, and the spatiotemporal drivers of population size and distribution (why and how). It discusses the main types of interactions between organisms and their population dynamics consequences. The structure of biological communities, how it varies in space and time, and terrestrial and aquatic ecosystems function, including energy and matter transfer at the ecosystem and higher organization levels. Finally, human effects on the environment will be analysed, and strategies for the sustainable exploitation of populations discussed.

These theoretical concepts will be illustrated by practical case studies and topical issues. This body of knowledge forms the basis of professional disciplines such as land planning, forestry, natural reserve management, environmental impact assessment, as well as research ecologists and academics.

Requirements

It is recommended to have the following three subjects already taken (Methods in Biodiversity and Conservation, Botany and Zoology). All activities in this course are conducted in English, so students are expected to have enough knowledge of this language. In addition, it is very recommendable the successful completion of a Statistics course.

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2. COMPETENCIES

General competencies:

1. Capacity for critical analysis of information related to Ecology.
2. Capacity for reading comprehension and synthesis.
3. Development of skills related to finding information, using databases and academic search engines to identify and select documents related to Ecology.
4. Ability to present an argument supported by textbooks and other sources of information provided on the subject.
5. Oral and written communication of ideas and concepts related to Ecology.
6. Consolidation of independent learning skills and the ability to work as part of a team in a responsible and committed manner, distributing tasks and sharing responsibility.

Specific competencies:

1. To understand the main concepts, principles and Theories that conform Ecology.
2. To understand the adaptive strategies of organisms and the factors that determine them.
3. To understand the relationships between organisms, and of these with their environment, and of the processes that determine population, community and ecosystem dynamics.
4. To understand the most relevant ecological patterns and their underlying biological processes.
5. Have an understanding of the methodologies used to answer ecological questions and to understand its practical applications.

Learning Achievements

1. Search, critically synthesize and communicate quantitative and qualitative information in ecology.
2. Differentiate the essential principles and processes that govern ecosystem functioning and be able to interrelate concepts across organization scales.
3. Understand the ecological basis of the environmental problems caused by the human species.
4. Be able to design research studies aimed at addressing ecological questions.

3. CONTENTS

Lectures	
SECTION 1. Introduction to ecology and evolutionary ecology **Chapter 0. Introduction (0.5h).** **Chapter 1. Conceptual introduction to Ecology (0.5h).** **Chapter 2. Evolutionary Ecology (3h).**	• 4 hours
SECTION 2. Abiotic factors and organismal responses **Chapter 3. Resources and environmental conditions. Climates, microclimates and the influence of geographic relief (4h).** **Chapter 4. Organisms, light and temperature (4h).** **Chapter 5. Organisms and water (3h).** **Chapter 6. Organisms and mineral nutrients (3h).**	• 14 hours
SECTION 3. Population ecology **Chapter 7. Properties of populations. Birth, death, dispersal and migration (5h).** **Chapter 8. Population dynamics (3h).** **Chapter 9. Intraspecific competition (2h).**	• 10 hours
SECTION 4. Organismal Interactions and community ecology **Chapter 10. Interspecific competition (4h).** **Chapter 11. Positive interactions (2h).** **Chapter 12. Predation, parasitism, and herbivory (5h).**	• 11 hours
SECTION 5. Community ecology **Chapter 13. Introduction to the study of communities. Species interaction networks (3h).** **Chapter 14. Biological diversity and quantification (3h).** **Chapter 15. Macroecology and biogeographical patterns (1h).** **Chapter 16. Disturbances and ecological succession (3h).**	• 10 hours
SECTION 6. The flux of energy and matter in ecosystems **Chapter 17. Introduction to the flux of energy and matter in communities. Trophic structure and energy transfer efficiency (2h)** **Chapter 18. Primary and secondary productivity in ecosystems (2h)** **Chapter 19. Flux of energy in communities and biogeochemical cycles (3h)**	• 7 hours

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Seminar sessions

In the 1st and 2nd quarters, 9 h and 8h of seminars will be given, respectively.

SEMINAR GROUPS SIZE WILL BE 25 STUDENTS.

1st quarter	
1. Write and present scientific results (3 hours). 2. Literature review of key concepts in Ecology leading to an oral and poster presentation (4 hours) 3. Critical review of a laboratory-based scientific article written by fellow students (1 hour)	• 8 hours
2nd quarter	
1. Understanding Population Dynamics through the Lotka–Volterra Model (2 hours) 2. Introduction to the *Ecology Conference on Conservation Biology*. Conduct a scientific review focusing on conservation biology and present it as an oral communication in the plenary sessions at the end of the course. (6 hours)	• 8 hours

Lab and field work sessions

Lab and fieldwork sessions (24 hours) will alternate throughout the course.

1st quarter: 10 hours (5 lab sessions of 2 hours each)

2nd quarter: 14 hours (1 field trip of 2 days duration)

1st quarter	
Lab session 1: Macroecology. Relationships between the geographic distribution of ectothermic and endothermic animals and their heat and cold tolerances.	• 4 hours (2 sessions)
Lab session 2: Design and carry out an experiment to analyse the effect of various environmental factors on plant development.	• 6 hours (3 sessions)
2nd quarter	
Fieldwork: Study of ecological patterns and processes in the field through the design, execution, and analysis of a scientific research project. The fieldwork has two modalities: (1) a two-day field trip with an overnight stay in a natural area, or (2) two one-day sessions on consecutive days in the surroundings of the campus. Once selected, the modality cannot be changed except in duly justified cases.	• 14 hours

4. TEACHING-LEARNING METHODS. TEACHING ACTIVITIES

4.1. Distribution of credits

Total number of hours: 300 (12 ECTS)	
Number of classroom hours: 96	• Lectures on theory: **56 hours.** • Seminars: **16 hours.** • Laboratory work / deskwork: **10 hours.** • Fieldwork: **14 hours.**
Number of hours of independent study by students: 194	• Self-study of theory, seminar and lab subjects: **119 hours.** • Individual or group preparation of subject topics: **30 hours.** • Reading of scientific and popular science texts: **15 hours.** • Preparation of scientific papers, posters and oral presentations: **30 hours.**
Individual or small group tutorials	• **10 hours.**

4.2. Methodological strategies, materials and educational resources

Classes	• Lectures to large groups. • Lectures to smaller groups on experimental design and scientific presentations. • Study and case study discussions. • Oral presentation of scientific information prepared by the students. • Carrying out scientific experiments or sampling in the lab, deskwork and fieldwork. • Idea debate, topics derived from popular science and scientific articles. • Critically reading and synthesising scientific articles.
Independent / self-study	• Self-study of areas that complement the topics covered in class. • Reading of scientific and popular science articles. • Finding information from the scientific literature to support the position taken in debates. • Writing scientific papers and a scientific poster. • Preparing an oral presentation using Power Point. • Study of the subject.

Individual tutorials	• Providing individualised attention to students through tutorials for monitoring adequately their progress.
Tutoring in small groups	• Providing attention to students in small groups to help them in different activities.

5. EVALUATION: Procedures, assessment criteria and marks

Theory, labs and seminars are evaluated separately and have a weight of 40%, 30% and 30% of the final mark, respectively. Theory, seminars and practical sessions are evaluated separately. Independently of the evaluation mode, to pass the subject, the student must pass each of these three parts (i.e. theory, seminars and lab).

EVALUATION PROCEDURES

Two evaluation modes are available, continuous and final. Students are expected to follow the Continuous Evaluation Mode. Exceptions to this require the Dean permission for choosing the Final Examination Mode (see below); permission that must be sought within the first two weeks of the course. Participation in the Continuous Evaluation Mode involves attending a mandatory minimum of 80% of classes (labs and seminars) to pass the course. In this continuous mode, 60% of the final mark will be obtained through a continuous evaluation process.

- Students are deemed ineligible for the Continuous Evaluation Mode when one or more of the following situations arise:
    - They have not attended the established minimum number of classes.
    - They have failed to participate in scheduled activities without good cause.
    - They have failed to deliver work within the prescribed period without good cause.
- Students are entitled to a final examination in the extraordinary examination session in case of failing the continuous evaluation.

EVALUATION CRITERIA

The evaluation is aimed at showing the extent to which the student has participated actively in class, and has the capacity of:

- Showing an understanding of the concepts and main ideas of the subject.
- Interrelating the different aspects of the theory.
- Analysing and scientific interpretation of data obtained in the field or the laboratory.
- Assimilating and applying subject contents to different situations.
- Finding scientific information about the questions posed related to the subject.
- Solving problems effectively and comprehensively.
- Arguing ideas coherently, both orally and in writing.
- Showing the ability for reflection and critical thought.

Regarding submitted work and reports, they will be assessed based on:

- Originality and synthesising ability.
- Coherent structure and good presentation.

- Sound and well dimensioned presentation of quantitative information.
- Clarity, quality, spelling and style of writing.
- Consultation and contrasting of the specialised literature.
- Hand in assignments in due form and timely manner.

In addition, students that undertake voluntary work over aspects of the subject can have their effort reflected in the final mark. For a given voluntary submitted work to be evaluated, the students must previously agree with the professor the contents, goals and requirements of the works.

MARKING CRITERIA

The final marks of the subject will correspond to the following numerical marks and scale, to a decimal precision level and a single qualitative mark:

• 0,0 – 4,9	*SUSPENSO (SS)*	(FAIL)
• 5,0 – 6,9	*APROBADO (AP)*	(PASS)
• 7,0 – 8,9	*NOTABLE (NT)*	(GOOD)
• 9,0 – 9,5	*SOBRESALIENTE (SB)*	(EXCELLENT)
• 9,5 – 10,0	*MATRÍCULA DE HONOR* limited to 5%	(HONORS)

A) CONTINUOUS EVALUATION MODE

The topics taught in **labs and seminars will be the basis for the continuous evaluation mode**. The student must attend a minimum of 80% of in-person classes for the continuous evaluation mode to be applied. Attendance will not be recognised as a merit and hence will not be positively marked.

The evaluation of each of the parts of the subject and its relative contribution to the final mark is as follows:

1. Laboratory and field work (3 marks out of 10):

Continuous evaluation of **practical classes** will correspond to:

- Short test / short question assignments. This type will be used in those labs where there is no writing of a scientific paper. The relative weight in the final mark of the practical will be 13%.
- The write up of a scientific article of one of the lab sessions of the first quarter. The relative weight in the final mark of the practical will be 37%.
- The write up of a scientific article of the fieldwork lab of the second quarter. The relative weight in the final mark of the practical will be 50%

If the teaching staff considers necessary to modify the relative weight of each practical evaluation due to unexpected and objective reasons, students will be informed well in advance by posting an informative note in the Virtual Classroom of the subject.

2. Seminars (3 marks out of 10):

Assessment will be based on the critical revision in written form of scientific articles, as well as oral presentations, posters and/or written assessments of Ecology topics selected by the professors.

The relative weight of each test in the final grade of seminars is as follows:

o Questionnaire of the review of a scientific article: 10%.
o Oral and written presentation of a poster on an Ecology topic decided by the teacher: 40% (30% the panel, 10% the oral presentation)
o Oral presentation on an ecology topic decided by the teacher at the Ecology congress: 50%

If the teaching staff considers necessary to modify the relative weight of each practical evaluation due to unexpected and objective reasons, students will be informed well in advance by posting an informative note in the Virtual Classroom of the subject.

3. Theory (4 marks out of 10)

To assess this part of the subject the student will take multiple choice and/or short question tests.

The students will take two exams during the course, and the final mark will correspond to their average. However, for the average to be calculated the student will require a minimum mark of 4.0 (over 10) in each exam. In case of failing one exam, the student has the option of only taking the extraordinary examination of that part in June-July instead of the two.

A student will be considered “No Presentado” (Not Presented) when, not having explicitly mentioned to the professors that they opt out of the Continuous Evaluation mode, have not participated in any activity of the teaching-learning process described above.

B) FINAL EXAMINATION MODE

This evaluation mode will be used by those students that do not select the continuous evaluation mode or, having selected the continuous evaluation modality, they finally fail to meet the requirements described in the section 5 of Subject evaluation. The final exam will have theoretical and practical exercises: Theory (55%), Labs (30%) and Seminars (15%). The type of exam will preferentially be written, multiple choice tests and/or short essay questions, but could also include oral questions. The areas that can be evaluated by this last procedure will be announced to the students well in advance.

A student will be deemed “No presentado” (Not Presented) to the examination, when having declined continuous evaluation, the student does not attend the final exam in due form and timely manner (date announced).

C) EXTRAORDINARY EXAMINATION

Students who attend the extraordinary examination session will be assessed using the procedure described in the “Final Examination Mode” section.

During the evaluation tests the guidelines set forth in the Regulation establishing the Standards of Coexistence of the University of Alcalá will be followed, as well as the possible implications of irregularities committed during such tests, including the consequences for committing academic fraud as set out in the Disciplinary Rules of the Students of the University of Alcalá.

The teaching-learning methodology and the assessment process will be adapted as needed, in accordance with the guidelines of the Diversity Support Unit, to implement curricular adaptations for students with specific needs.

6. BIBLIOGRAPHY

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