Biology and Diversity in Terrestrial Vertebrates

Code: 100850
ECTS Credits: 6

2025/2026

Degree	Type	Year
Environmental Biology	OT	4

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

To have passed the subjects of "Zoology" and "Extension of Zoology" of the Degree of Biology or the Degree of Environmental Biology.

Objectives and Contextualisation

The main goal of this subject is that the students acquire theoretical and practical knowledge on the anatomy, diversity and evolution of the main groups of tetrapods (see Theory section). In addition, that they learn the most relevant biological aspects and, in particular, the adaptations to the environment and life strategies of the most diversified groups.

The specific training aims are the following:

- Identify the diagnostic traits of the main taxonomic groups.
- Recognize the presence of the principal lineages in the fossil record and the factors influencing their diversification.
- Gain insight into the internal phylogenetic relationships of the main lineages.
- Understand environmental adaptations of representative taxonomic groups.

- Learn essential aspects of biology and the ecological importance of specific groups.
- Identify species of Catalan terrestrial vertebrates, relate their morphology and biology to their habitat, and be aware of their conservation status.
- Become familiar with monitoring programs for terrestrial vertebrates and citizen science portals to contribute or consult data.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Communicate efficiently, orally and in writing.
- Identify and interpret the diversity of species in the environment.
- Identify organisms and recognise the different levels of biological organisation.
- Integrate knowledge of different organisational levels of organisms in their functioning.
- Obtain, observe, handle, cultivate and conserve specimens.
- Recognise and analyse phylogenetic relations.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Actuar en l'àmbit de coneixement propi avaluant les desigualtats per raó de sexe/gènere.
3. Collect, determine and conserve specimens and collections of invertebrates and vertebrates.
4. Communicate efficiently, orally and in writing.
5. Interpret and recognise the different states of development of invertebrates and vertebrates.
6. Interpret the distribution and the interactions in the environment of invertebrates and vertebrates and their impact on biological diversity.
7. Interpret the evolutionary processes that have led to the diversity of invertebrates and vertebrates.
8. Interpret the origin and functioning of organic structures in the different groups of invertebrates and vertebrates.
9. Recognise the characteristics that distinguish the principal groups of invertebrates and vertebrates.
10. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.

Content

Theory

Topic 1. Origin and radiation of the tetrapods. The transition of vertebrates to the terrestrial environment: transitional fossils, possible causes, and adaptations to the terrestrial environment.

Topic 2. Adaptations, biology and diversification of lissamphibians.

Topic 3. Amniotes. Sauropsids and synapsids: two approaches to terrestrial life.

Topic 4. Sauropsids. Phylogenetic relationships. Lepidosauromorphs. Diversification and biology of sphenodonts and squamates.

Topic 5. Phylogenetic position of turtles. Archaelosaurs. Testudinates. Evolution, diversification and biology.

Topic 6. Arcosauromorphs. Diversification and biology of crocodilians.

Topic 7. Dinosaurs: origin, synapomorphies and phylogeny. Origin and diversification of birds.

Topic 8. Avian specializations.

Topic 9. Synapsids. Diversification of synapsids. Mammals: synapomorphies and main lineages.

Topic 10. Biology and diversification of monotremes. Biology and diversification of marsupials. Radiation of the eutherians. Biology and adaptations of representative taxonomic groups of eutherians.

Practical classes

Practice 1. Amphibians: morphology, diversity and identification.

Practice 2. Sauropsids: morphology, diversity and identification of squamates and turtles.

Practice 3. Mammals: morphology, diversity and identification.

Practice 4. Comparative study of the tetrapod skeleton.

Field practices

Field trips to observe terrestrial vertebrate species and their signs in the natural environment and/or visits to research or conservation centres.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field practices	12	0.48	1, 2, 10, 7, 5, 6, 8, 3, 9
Laboratory practices	16	0.64	10, 4, 7, 5, 8, 3, 9
Lectures	18	0.72	7, 5, 6, 8, 9
Seminars	6	0.24	1, 2, 10, 4, 7, 5, 6, 8, 9
Type: Autonomous			
Preparation of works and resolution of issues	34	1.36	1, 2, 10, 4, 7
Study and resolution of issues	53	2.12	4, 7, 5, 6, 8, 9

The methodology used to achieve the learning process is based on the combination of lectures, seminars, personal study, and individual and group work.

Theory

With these classes the students acquire the basic theoretical knowledge of the subject, which must be complemented with the personal study of the topics explained by the teacher. These classes highlight and address the essential points of each teaching unit. Subsequently, the student will have to supplement the

conceptual map established during the classes with the information from different sources that will be provided to them. Classes last 50 minutes and in them audiovisual material prepared by the teacher will be used.

Seminars

The aim of the seminars is to promote the capacity for analysis and synthesis, critical reasoning, and the capacity to solve problems. The seminars are designed for students to work in small groups, so that they mainly acquire the skills associated with this type of activity. During the seminars, topics related to the theoretical program will be actively worked and some of the following activities may be carried out: oral and/or written presentation of a topic, resolution of questions and problems, analysis and discussion of articles, cases or problems.

Practices

The objective of the practical classes is to complete and reinforce the zoological knowledge acquired in the theoretical classes and seminars. In the practical sessions, specific skills will be stimulated and developed, such as the ability to observe, analyze and interpret anatomical structures, detect adaptive or phylogenetically important characters, and taxonomic identification of specimens. For its correct execution, students will be provided withaguide for each of the established sessions. During the laboratory practice sessions, students will work on zoological material and complement their knowledge with the study and questions posed by the teacher. Field practices will allow students to acquire techniques for the observation and identification of land vertebrate species in their natural environment, learn the environments that these species occupy, and know how to interpret the morphology of these species in an ecological and adaptive context. To achieve these objectives, non-invasive sampling techniques will be used (such as direct observation with binoculars and terrestrial telescopes, phototrapping and the study of acoustic signals and tracks) and live capture techniques (such as Sherman traps), thus attempting to minimize the impact on fauna while raising awareness among students about the need for conservation and consideration of the ethical aspects of research with animals. In some of the taxonomic groups, such as amphibians or small mammals, standardized sampling protocols to monitor common species that are currently employed (SACC and SEMICE, respectively) will be used. This will allow students to become familiar with these programs and understand the importance of citizen science. In addition, the data obtained will be collected and entered into a citizen science portal so that it will be available to students of subsequent courses, the scientific community and the general public.

Tutorships

Tutorships will serve to clarify concepts, to establish acquired knowledge, to facilitate the study to the students and to solve possible eventualities that can arise during the development of the subject. The schedule of individualized tutorships will be specified with the teacher via email or orally.

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
Individual evaluation (first midterm exam)	30% of the final mark	2.5	0.1	4, 7, 5, 6, 8, 9
Individual evaluation (second midterm exam)	30% of the final mark	2.5	0.1	4, 7, 5, 6, 8, 9
Laboratory and field practices	25% of the final mark	2	0.08	1, 2, 10, 4, 7, 5, 6, 8, 3, 9
Seminars (	15% of the final mark	4	0.16	1, 2, 10, 4, 7, 6, 8, 9

The evaluation of this subject will be carried out by means of the the following procedures:

Evaluation of the theoretical contents

The theoretical knowledge acquired by the students will be assessed individually. This evaluation will be carried out by means of two midterm exams (each with a weight of 30% of the final mark) that will contain test-type questions and/or short or medium development questions. Students who do not obtain a minimum mark of 4 (out of 10) will have to recover them in a final exam that will contain questions of the same type as those of the midterm exams. Likewise, students who wish to improve the mark of any of these exams will have the opportunity to do it in the final exam, but the previously obtained mark will be lost. The evaluation of the theoretical contents has an overall weight of 60% (corresponding to the sum of the percentages of each midterm exam) of the final mark. In order to be able to average with the other evaluative activities (seminars and practices) the average mark of the two exams must be equal or greater than 4. To participate in the final exam, students must have been previously evaluated in a set of activities, which weight equals a minimum of two thirds of the total mark of the subject. Therefore, the students will obtain the "Not Evaluable" qualification when the evaluation of the activities performed have a weight lower than 67% in the final mark.

Evaluation of the seminars

The content and quality of the works presented on the seminar days will be evaluated, as well as the evaluation tests (group and individual) that will be carried out during the course of the seminars. The grade corresponding to seminars has an overall weight of 15% of the final grade.

This activity has no possibility of recovery.

Evaluation of practices

Attendance to laboratory practice sessions and field trips is mandatory. After each practice, students will take an individual test that assesses the use and achievement of the specific skills of each practcie.

The grade corresponding to the practices has an overall weight of 25% of the final grade.

This activity has no possibility of recovery.

Single evaluation

The students who take advantage of the single evaluation must carry out the laboratory (PLAB) and field practices (PCAM) presentially and they will have a weight of 25%. Whenever the activity requires it, the seminars (SEM) will also be of compulsory attendance, which will have a weight on the final grade that will be the same as that of the continuous evaluation (15%).

The single assessment consists of a single synthesis test (with multiple choice and develop questions) on the contents of the entire theory programme.

The mark obtained in the synthesis test is 60% of the final mark of the subject, the one obtained in the practices 25% and the seminars the remaining 15%.

The single assessment test will be done coinciding with the same date set in the calendar for the last continuous assessment test and the same recovery system will be applied as for the continuous assessment.

To pass the subject it is necessary to obtain a minimum final mark of 5 points out of 10 in the set of evaluation activities and a minimum mark of 4 out of 10 in the theory part.

Final considerations

The minimum overall grade required to pass the course is 5 out of 10.

Anyone who, due to a justified cause (illness, death of a relative, accident, etc.), can not attend an individual assessment test and provides the corresponding official documentation, will have the right to perform this exam on another date.

Use of Artificial Intelligence: Restricted Use. For this course, the use of Artificial Intelligence(AI) technologies is permitted exclusively for support tasks, such as bibliographic or informational searches, text correction, or translations. The student must clearly identify which parts have been generated using this technology, specify the tools employed, and include a critical reflection on how these have influenced both the process and the final outcome of the activity. Failure to be transparent about AI usage in this assessed activity will be considered a breach of academic honesty and may result in a partial or complete penalty in the activity grade, or more severe sanctions in serious cases.

Bibliography

Basic bibliography

Clack, J.A. 2012. Gaining Ground: the Origin and Evolution of Tetrapods. 2nd ed. Indiana University Press, Bloomington, Indiana, USA.

De Iuliis, G., Pulerà, D. 2019. The dissection of Vertebrates. 3rd ed. Academic Press, Elsevier, Oxford. (available in electronic format at the UAB library)

Hildebrand, M. 2001. Analysis of Vertebrate structure. 5th ed. John Wiley & Sons.

Kardong, K. V. 2008. Vertebrates: comparative anatomy, function, evolution. 8th ed. McGraw-Hill Education.

Liem, K., Bemis, W., Walker, W. F., Grande, L. 2000. Functional Anatomy of the Vertebrates: an evolutionary perspective. 3rd ed. Harcourt College Publishers.

Linzey, D. 2012. Vertebrate biology. 2nd ed. Johns Hopkins University Press.

Mayr, G. 2017. Avian evolution. John Wiley & Sons, New York. (available in electronic format at the UAB library)

Nadal, J. 2001. Vertebrados. Origen, organización, diversidad y biología. Omega.

Pough, F. H., Janis, C. M., Heiser, J. B. 2022. Vertebrate life. 11th ed. Oxford University Press.

Schoch, R. R. 2014. Amphibian evolution. John Wiley & Sons (available in electronic format at the UAB library)

Some web sites of general interest

AmphibiaWeb: https://amphibiaweb.org/

Animal Diversity Web: http://animaldiversity.ummz.umich.edu/

Asociación Herpetológica Española: http://www.herpetologica.es/

Catàleg d'amfibis i rèptils: https://pagines.uab.cat/3dvirtualherp/ca

Enciclopedia Virtual de los Vertebrados Ibéricos: http://www.vertebradosibericos.org/

International Comission on Zoological Nomenclature: http://www.iczn.org/

Museo Nacionalde Ciencias Naturales de Madrid (CSIC): http://www.mncn.csic.es/

Museu de Ciències Naturals de Granollers: https://mcng.cat/

Natural History Museum, Londres: http://www.nhm.ac.uk/

Palaeos: http://palaeos.com/vertebrates/

Sociedad Española para La Conservación y Estudio de los Mamíferos: http://www.secem.es/

SEO/BirdLife (Sociedad Española de Ornitología): http://www.seo.org/

Societat Catalana d'Herpetologia: http://soccatherp.org/

The Reptile Database: http://www.reptile-database.org/

Tree of life Web Project (1996-2008): http://tolweb.org/tree

Software

R software will be used at a basic level in one of the seminar sessions. In another of the seminars students will be introduced to the use of the app KiriEngine for the obtention of 3D models.

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
(PCAM) Field practices	241	Catalan	second semester	morning-mixed
(PCAM) Field practices	242	Catalan	second semester	morning-mixed
(PCAM) Field practices	243	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	241	Catalan	second semester	afternoon
(PLAB) Practical laboratories	242	Catalan	second semester	afternoon
(PLAB) Practical laboratories	243	Catalan	second semester	afternoon
(SEM) Seminars	241	Catalan	second semester	morning-mixed
(TE) Theory	24	Catalan	second semester	morning-mixed