

**Zoology**

Code: 102795  
ECTS Credits: 6

Degree	Type	Year	Semester
2501915 Environmental Sciences	OB	2	1

**Contact**

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**Use of Languages**

Principal working language: catalan (cat)  
Some groups entirely in English: No  
Some groups entirely in Catalan: Yes  
Some groups entirely in Spanish: No

**Other comments on languages**

Most of the sessions will be in Catalan. However, some teaching material and some sessions might be in English.

**Teachers**

Francesc Muñoz Muñoz

**Prerequisites**

There are no official prerequisites, but it is appropriate for the student to review the contents related to Zoology of the Biology subject of High School.

**Objectives and Contextualisation**

The subject Zoology is within the subject of Biology for the environmental sciences as a compulsory subject. It shares this subject, and therefore competences, with other compulsory subjects such as Microbiology, Ecology and Soil Sciences and a set of optional subjects such as: Vegetation analysis, Applied ecology, Toxicology, Environmental microbiology, Physiology Environmental and Genetics.

Zoology is a compulsory subject that consists of 6 ECTS credits and is taught in the first semester of the second year.

Throughout this course, the student must acquire the theoretical-practical knowledge that gives the student a vision, as fully as possible, of the bases of zoological knowledge and the diversity of animals from an environmental perspective, but also anatomical, functional, systematic and phylogenetic.

It also has to allow the student to know animal diversity and place each animal group in an ecological context, know its position within the ecosystems in relation to the number of species, the habitat they occupy and their way of life, as well as to know its importance in relation to man from a social and economic perspective.

The specific training objectives are:

- To introduce to the student the main structuring concepts of the science of Zoology.

- To understand the systematics and phylogenetic relationships between the main groups of animals as a result of evolutionary and adaptive processes.
- To know the main levels of organization and architectural patterns of animals.
- To know the diversity of the main animal groups.
- To give some basic knowledge about the morphological features, biological cycles, ecological importance and the interactions with the humans of the main groups of animals.

## Competences

- Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
- Analyze and use information critically.
- Collect, analyze and represent data and observations, both qualitative and quantitative, using secure adequate classroom, field and laboratory techniques
- Demonstrate adequate knowledge and use the most relevant environmental tools and concepts of biology, geology, chemistry, physics and chemical engineering.
- Demonstrate concern for quality and praxis.
- Demonstrate initiative and adapt to new situations and problems.
- Learn and apply in practice the knowledge acquired and to solve problems.
- Quickly apply the knowledge and skills in the various fields involved in environmental issues, providing innovative proposals.
- Teaming developing personal values regarding social skills and teamwork.
- Work autonomously

## Learning Outcomes

1. Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
2. Analyze and use information critically.
3. Define the basic principles of zoology.
4. Demonstrate concern for quality and praxis.
5. Demonstrate initiative and adapt to new situations and problems.
6. Describe the basics of plant and animal toxicology.
7. Diagnose and solve environmental problems concerning the biological environment.
8. Identify and interpret the diversity of organisms in the environment.
9. Identify organisms and biological processes in the surrounding environment and evaluate them properly and originally.
10. Identifying and using bioindicators.
11. Learn and apply in practice the knowledge acquired and to solve problems.
12. Mostrear, characterize and manipulate specimens, populations and communities.
13. Observe, recognize, analyze, measure and properly and safely represent organisms and biological processes.
14. Participate in environmental assessments as to the biological environment.
15. Teaming developing personal values regarding social skills and teamwork.
16. Work autonomously

## Content

### I. INTRODUCTION TO ZOOLOGY: FUNDAMENTAL CONCEPTS

Unit 0.- Presentation of the subject.

Unit 1.- Definition and object of Zoology. Animal concept and characteristics. Current situation of animals among living beings. Species concept. Speciation and reproductive isolation. The process of speciation: types and causes. Zoogeography: geotechnical regions. Cosmopolitan and endemic species. Current biodiversity and extinctions.

Unit 2.- The ordering of the animal world. Taxonomy: taxon concept. Relations between taxonomic groups. Nomenclature: rules of animal nomenclature. Concept of Anatomy. Anatomical methods: morphometry, dissection, organography. Concept of Morphology. Taxonomic schools. Systematic. Homology and Homoplasty. Convergence and Parallelism.

Unit 3.- Basic principles of Zoology. The structural pattern of animals: Levels of organization. Concept and type of symmetry. Cephalisation. Concept of segmentation (metamery) and serial repetition (pseudometamery).

Unit 4.- Animal reproduction. Asexual reproduction and its types. Sexual reproduction and their types. Types of gametes and gametogenesis. Internal and external fertilization. Parthenogenesis. Adaptive meaning of the different reproductive patterns.

Unit 5.- Embryonic development. Concept of ontogeny. Type of eggs. Segmentation Formation of the blastula. Gastrulation Formation of mesoderm and celoma. Characters of acoelomates, pseudocoelomates and eucoelomates. Protostome and deuterostome characters. Post-embryonic development: Paedomorphosis concept. Direct and indirect development. Metamorphosis Indirect and indirect biological cycles. Cycles of parasites.

## II. STRUCTURAL ORGANIZATION OF ANIMALS. DIVERSITY

Unit 7.- Basal Metazoa: Porifera. Cell organization: group cytology. Structural types and their adaptation to the aquatic environment. Reproduction and biological cycles. Diversity of the sponges: Hexactinellides, Demospongia and Limestones.

Unit 8.- Basal Metazoan: Cnidaria. General characteristics of the group. Structure of polyps and jellyfish. Biological cycles Diversity of the Cnidaria: characteristics and diversity of the most representative Medusozoa (Hydrozoa, and Scyphozoa) and of the Anthozoa.

Unit 9.- Bilateral Metazoa: Lophotrochozoans. Definition, characteristics and composition of the group. Platyhelminthes: General characteristics. Diversity of Platyhelminthes: the group of "Turbellaria" and the parasitic groups of Monogeneans, Trematodes and Cestodes. Characteristics of biological cycles.

Unit 10.- Mollusks. Structural characteristics of the group (head, foot and visceral mass). Importance of the mantle and the shell and its evolution. Main groups of Molluscs. Monoplacophora and Polyplacophora, Scaphopoda, Cephalopoda, "Gastropoda" and "Bivalvia". Diversification and adaptive capacities to different habitats.

Unit 11.- Ring cells. Structural organization of an annelid. The metamerization in the annelids. Organization of a metamere. Organization model of the group of "Polychaeta", and Clitellates (Oligochaetes and Hirudinia). Importance of Oligochaetes in the edaphic environment. Use of ringworms for man.

Unit 12.- Ecdysozoa. Definition, characteristics and composition of the group. Nematodes General characteristics. Biological cycles Adaptations to the different habitats and types of life. Groups of medical, veterinary and phytosanitary interest. Entomopathogenic nematodes as agents for biological control of insect pests.

Unit 13.- Arthropods. General characteristics of the arthropodization. The evolutionary success of the Arthropods.

Unit 14.- Arthropods Diversity I: Chelicerata. General characteristics of the group. Main groups and adaptations to the different habitats. Myriapodes General characteristics of the group. Main groups and adaptations to the different habitats.

Unit 15.- Arthropods Diversity II: Crustaceans. Main characteristics Biology and adaptations of the main groups.

Unit 16.- Arthropods Diversity III: Hexapods. General characteristics of the group. Endocrine and Insect. The main groups of insects and their adaptations.

Unit 17.- Deuterostomes. Definition, characteristics and composition of the group

Unit 18.- Echinoderms. Definitive characteristics. Organization, biology and adaptive diversification of the different groups.

Unit 19.- Chords. Generalities Diagnosis and basic structure.

Unit 20.- Urocordates and cephalocordates. General organization of the Urocordates and diversity of the group (Apendicullaria, Ascidia, and Taliacia). Cephalococcal: diagnosis and general characteristics.

Unit 21.- Vertebrates. General Characters of the group and main modifications. Adopted classification of vertebrates.

Unit 22.- Vertebrates diversity I: Actinopterygii. Diversity: Agnates and Gnathostomes. Actinopterygia and Sarcopterygia.

Unit 23.- Vertebrates Diversity II. Tetrapods, not amniotic and amniotic. Diapsides and Synapsides (Mammals): Prototeria and Teria (Metateria and Euteria).

### III. FAUNA MANAGEMENT

Unit 24.- Management of harmful fauna: Animal pests. Plague concept Dangers of fauna towards human beings. Factors that determine the onset of pests. Pest control methods. Environmental problem of the use of chemical pesticides. Integrated Control and Biological Control of pests.

Unit 25.- Management of threatened fauna. Dangers of zoological diversity. Causes of extinction caused by man. Needs to conserve wildlife. Conservation "In situ" and "Ex situ". Categories of the conservation status of the fauna. Legal framework for the conservation of threatened fauna in Catalonia and Spain. Conservation catalogs, plans and strategies, red lists and wildlife hares.

### PROGRAM OF PRACTICES: (20 h)

#### I. SAMPLE AND DIVERSITY OF FAUNA MARINA

Practice 1: Field sampling. Marine sampling (4 h)

Practice 2: Analysis of the diversity of marine sampling. (3 h)

#### II. DISSERTATION AND DIVERSITY OF LAND FAUNA

Practice 3: Field sampling. Sampling of terrestrial fauna. (4 h)

Practice 4: Analysis of the diversity of wildlife collected at field exit. (3 h)

Practice 5: Techniques of analysis of the diversity of vertebrate wildlife. (2 hr)

### III. FAUNA MANAGEMENT

Theoretical-practical seminar: In situ and ex situ wildlife management. (4 h)

## **Methodology**

The methodology used in this subject to achieve the learning process is based on making the student work the information that is put to his reach. The function of the teacher is to give the information or to indicate where you can get it and help him and tutor you so that the learning process can be carried out effectively. To achieve this goal, the subject is based on the following activities:

**Master classes:**

With these classes the student acquires the basic scientific-technical knowledge of the subject that must complement with the personal study of the explained subjects.

**Seminars:**

The seminars work on the scientific and technical knowledge exposed to the master classes to complete their understanding and deepen them, developing various activities: analysis and discussion of videos on zoological topics, resolution of issues related to the topics covered, Zoological information, etc.

The mission of the seminars is to promote the capacity for analysis and synthesis, critical reasoning and the ability to solve problems.

**Practices:**

In the practical sessions, the student will learn in a practical way how wildlife is studied in the field (both terrestrial and aquatic fauna). Likewise, during the practice sessions in the laboratory, students will work on the zoological material (observation of preparations and specimens, study of anatomy and morphology of groups, dissections, identification of specimens, etc.) and will complement it with the study and questions posed to the corresponding practice scripts.

The objective of the practical classes is to complete and reinforce the zoological knowledge acquired in the theoretical classes and seminars. Practical sessions will be stimulated and developed in the student empirical skills such as the ability to observe, analyze and recognize zoological diversity.

**Activities**

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field practices	8	0.32	
Laboratory practices	8	0.32	
Master classes	22	0.88	
Problem resolution or class practice	4	0.16	
Seminars	8	0.32	
Type: Supervised			
Tutorials	10	0.4	
Type: Autonomous			
Study and resolution of problems	82	3.28	

**Assessment**

The evaluation of this subject is carried out throughout the course:

#### Evaluation of seminars:

Both the small papers (issues) that will be presented on the seminar days will be evaluated, such as the evaluation tests (group and individual) that will be developed throughout the seminar.

Similarly, in the seminars there will be a student observation record, where it will be identified if the students reach the most attitudinal competences by observing the teacher's attitude in the different types of activities that are carried out in Seminars (participation in discussions and debates, initiative, interest, group work, oral expression in public). The evaluation of this activity will have a value that will oscillate between the -1 and 1 that will be added to the note of the seminars achieved with the works and the evaluation tests indicated above.

The note corresponding to the seminars has a global weight of 25% of the final grade. There will be no recuperation of the mark obtained in the seminars part.

#### Evaluation of the exams:

##### Partial exams:

In these parts, the students' knowledge in the subject, as well as their capacity for analysis and synthesis, and critical reasoning, will be evaluated individually. The exam will have a part of test questions and another of conceptual questions, schemes, etc.

There will be 2 obligatory partial exams, each with a weight of 30% of the overall grade.

##### Final exam:

Students who do not pass one of the two partial examinations (minimum grade: 5 out of 10) can retrieve the exam not passed to the final exam. Likewise, students who wish to improve the grade of one or both of the parts can do this by presenting themselves to the final exam, but the previously obtained note will be lost.

The mark corresponding to the two exams has a global weight of 60% of the final mark. In order to be able to make the average of the mark of the exams with the other evaluative activities, it is necessary to have a minimum mark of the exams of 4.

To ask for a reevaluation the student must have been received a mark in activities that represent at least 2/3 of the global mark during the course.

#### Evaluation of the practices:

For the assessment of the practices, three evaluation activities will be used:

##### Teaching folder:

It consists of a series of learning materials that are done during the different practical activities (exits, visits and laboratory) and that each student is accumulating throughout the course. These materials can be traces of follow-up or visits, field books of observations, small tests of evaluation on some practice or exit, etc.

The teaching folder corresponds to 75% of the mark of the practices.

##### "Visum" test:

During the course, students will have a list of animals that have been able to identify and at the end of the semester they must know how to identify "visum" (at the taxonomic level indicated that it will not always be species). At the end of the practices, a written test will be done where some of these animals must be recognized, based on images or samples.

The "visum" test corresponds to 25% of the practice mark.

##### Student observation record:

It is a question of identifying if the students reach the most attentive competences by means of the observation by the teacher of their attitude in the different types of activities that they carry out in the practices (visits, field trips and laboratory sessions). The evaluation of this activity will have a value that will oscillate between -1 and 1 that will be added to the practical note obtained by the two previous evaluations.

The final grade obtained in the practices, has a global weight of 15% of the final mark of the subject.

There will be no recuperation of the mark obtained in the practical part.

## Final Considerations:

It will be considered that a student will obtain the non-appraising qualification when the evaluation of all the assessment activities carried out does not allow him to achieve the overall grade of 5 in the event that he had obtained the maximum grade in all of them.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of the practices and examination visual observation, analysis and recognition of the zoological diversity.	15%	1.5	0.06	2, 11, 3, 4, 6, 7, 9, 8, 10, 12, 13, 14, 1, 16, 15
Group and individual tests at the seminars	25%	3	0.12	2, 11, 3, 5, 4, 6, 7, 9, 8, 10, 12, 13, 14, 1, 15
Partial examination 1 (individual assessment)	30%	1.5	0.06	2, 3, 4, 6, 7, 9, 8, 10, 13, 14, 1
Partial examination 2 (individual assessment)	30%	2	0.08	2, 3, 4, 6, 7, 9, 8, 10, 13, 14, 1

## Bibliography

- BARRIENTOS, J.A. (2004). Curso práctico de Entomología. Asociación Española de Entomología. CIBIO-UAB. Manuals de la Universitat Autònoma de Barcelona.
- BERGBAUER, M. i HUMBERG, B. (2001) Flora y fauna submarina del Mar Mediterráneo. Ed. Omega.
- BRUSCA R.C. i BRUSCA G.J. (2005). Invertebrados. Ed. MacGraw-Hill. Interamericana. Segona edició.
- HICKMAN, C.P., ROBERTS, L.S., KEENS, L., LARSON, A., L'ANSON, M., EISENHOUR, D.J. (2009). Principios integrales de Zoología. Ed. Interamericana. Catorzena edició.
- HISTÒRIA NATURAL dels Països Catalans. (1991) Vols. 8, 9, 10. Ed. Enciclopèdia Catalana.
- JACAS, J., CABALLERO, P. i AVILLA, J. (eds) (2005). El control biológico de plagas y enfermedades. Universitat Jaume I Universidad pública de Navarra.
- JIMÉNEZ PÉREZ, I. i DELIBES DE CASTRO, M. (eds) (2005) Al borde de la extinción: una visión integral de la recuperación de fauna amenazada en España. EVREN. Valencia
- KARDONG, K.V. (2006). Vertebrados. Anatomía comparada, función y evolución. McGraw-Hill. Interamericana.
- POUGH F.H., JANIS C.M. i HEISER J.B. (2005). Vertebrate Life. Pearson, Prentice Hall. Setena edició.
- RUPPERT E., FOX R. i BARNES R. (2004). Invertebrate Zoology. A Functional Evolutionary Approach. Setena Edició. Thompson. Brooks/Cole. USA

## Web pages:

- Bridging the Gap: Apropant la recerca en biologia marina: <http://grupsderecerca.uab.cat/biologiamarina/ca>
- Aula Virtual de l'Autònoma Interactiva: <https://cv2008.uab.cat>
- Animal Diversity Web: <http://animaldiversity.ummz.umich.edu/>
- Adena/World Wildlife Found: <http://www.wwf.es/>
- Biodidac: <http://biodidac.bio.uottawa.ca>
- Comissió Internacional de Nomenclatura Zoològica: <http://www.iczn.org/>

- Fauna Ibérica: programa de investigación científica sobre labiodiversidad zoológica en el ámbito ibero-balear: <http://www.fauna-iberica.mncn.csic.es/>
- IUCN (International Union for Conservation of Nature): <http://www.iucn.org/>
- IUCN Red List web site: <http://www.iucnredlist.org/>
- Ministeri de Medi Ambient. Biodiversitat. Inventari Nacional de Biodiversitat: <http://www.mma.es/portal/secciones/biodiversidad/>
- Museu Nacional de Ciències Naturals de Madrid (CSIC): <http://www.mncn.csic.es/>
- Natural History Museum, Londres: <http://www.nhm.ac.uk/>
- Tree of Life Project: <http://phylogeny.arizona.edu/tree/phylogeny.html>