

**Zoology Extension Course**

Code: 100791  
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	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**

Some teaching materials (informative texts, articles, videos, etc.) may be in English

**Teachers**

Guillermo Peguero Gutierrez

**Prerequisites**

There are no specific official prerequisites to be able to take this subject.

**Objectives and Contextualisation**

The general objective of this subject is that students acquire theoretical and practical knowledge that gives a vision as most complete as possible of the diversity of Arthropods and Chordates from a morphological, functional and systematic perspective.

The specific aims are:

- To know the basic structural pattern of Arthropods (especially Insects) and Chordates (especially Vertebrates).
- To know the differential and defining features of the main Arthropod and Chordate groups, as well as the modifications of the different systems in the main subgroups of Chordates (especially Vertebrates) and Arthropods (especially Insects).
- To know the possible functional base, and therefore adaptive, of the differential characteristics of the main Arthropod and Chordate groups.
- To obtain a preliminary vision of the main phylogenetic hypotheses that aim to explain the diversification processes leading to the current groupings (large groups) of Arthropods and Chordates.

## Competences

- Analyse and interpret the origin, evolution, diversity and behaviour of living beings.
- Be able to analyse and synthesise
- Be able to organise and plan.
- Describe and identify the levels of organisation of living beings.
- Develop a sensibility towards environmental issues.
- Develop independent learning strategies.
- Identify and classify living organisms.
- Obtain, manage, conserve and observe specimens.

## Learning Outcomes

1. Analyse and interpret animal diversity and the phylogenetic lines of the metazoa.
2. Apply dissection methods to observe and analyse the internal anatomy of representative samples of the principal animal groups.
3. Apply methods for identifying and classifying the principal animal groups.
4. Apply techniques for the study of animal anatomy.
5. Be able to analyse and synthesise.
6. Be able to organise and plan.
7. Describe and identify the levels of organisation of animals.
8. Develop a sensibility towards environmental issues.
9. Develop independent learning strategies.
10. Identify and classify animals from morphological features.

## Content

### ARTHROPODS

Unit 1.- What is an Arthropod? Definition of Arthropod. Positional characters. Traits of Arthropodization. Presentation of the large groups. Position of the Arthropods in the animal world.

Unit 2.- The cuticle and the moult. The layers of the integumentary system. Structure of the cuticle. Cuticle formations and coloration. Cuticle functions. Moulting or ecdysis.

Unit 3.- Metamerism, tagmatization and appendices. Generalized structure of a metamere. Basic terminology. Tagmatization: body regions. Cephalization. Basic organization of an appendix. Types and functions of the appendices.

Unit 4.- Internal organization. The central nervous system: brain and central nervous chain. The sympathetic nervous system. Neuroendocrine system and endocrine organs. Sensory organs. Digestive system. Excretory and respiratory systems. The coelom and the circulatory system. The reproductive system.

Unit 5.- Reproduction and development. Gonochorism. Parthenogenesis. Embryonic development. Post-embryonic development. Type of post-embryonic development. Type of larvae Metamorphosis.

Unit 6.- General classification. General arrangement of Arthropods. Some evolutionary hypotheses. Chelicerates. Basic characters of Chelicerates. Main groups: Scorpions, Spiders, Opiliones and Mites.

Unit 7.- Crustaceans. Basic characters of Crustaceans. Main groups: Branchiopods, Ostracods, Copepods, Hoplocarids, Peracarid Malacostracans and Eucarid Malacostracans.

Unit 8.- Myriapods. Main groups of Myriapods: Diplopods and Chilopods.

Unit 9.- Hexapods. Peculiarities of the Hexapods. General external morphology of Hexapods. Main groups of Hexapods. Main lines of diversification. Main groups: Collembolans, Odonatans, Orthopterans, Isopterans, Blattodeans, Lepidopterans, Dipterans, Coleopterans, Hymenopterans, Thysanopterans and Hemipterans.

## CHORDATES

Unit 10.- Chordates. Position of the Chordates within the animal world, abundance and diversity. Basic characters and general organization.

Unit 11.- The concept of "Prochordate". Urochordates. Diagnostic characters. General organization of ascidians. Diversity of Urochordates. Representative biological cycles.

Unit 12.- Cephalochordates. Diagnostic characters. General organization and development.

Unit 13.- Craniates. Definition. Interpretation of its structure in an evolutionary framework. Development. General diversity. General considerations about its classification.

Unit 14.- The first Craniates. "Agnathans": the Craniates without jaws. Myxiniiformes. Petromyzontiiformes. Gnathostomes: the conquest of the aquatic environment. Acquisition of jaws and paired fins. Adaptations to life in the water. Chondrichthyes: diagnostic characters and diversity. The evolutionary success of the Osteichthyes. Actinopterygii: diagnostic characters and diversity. Chondrostei and Neopterygii.

Unit 15.- The conquest of the terrestrial environment. Sarcopterygii: diagnostic characters and diversity. The dipnoans and the coelacanth. Tetrapods: origin, diagnostic characters and adaptations to the terrestrial environment. Amphibians: diagnostic characters and diversity. Lissamphibia: Anura, Urodela and Gymnophiona.

Unit 16.- The expansion of terrestrial vertebrates. Evolutionary criteria for the diagnosis of large groups of Amniotes. The first Amniotes. The concept of "Reptile". Anapsida: Chelonia. Diagnosis characters and diversity of the diapsids. Lepidosauria: Sphenodontia and Squamata.

Unit 17.- Archosaurs: diagnostic characters and diversity. Crocodiles. Dinosaurs. Birds: origin and fundamental characteristics. Feathers. *Archaeopteryx* and the Cretaceous Birds. Diversity of modern Birds.

Unit 18.- Synapsids. Origin and diagnostic characters of Mammals. Monotremes: oviparous mammals. Therians: diagnostic characters. The placenta. Marsupials: diagnostic characters and diversity. Eutherians: diagnostic characters. The adaptive radiation of the Eutherians.

## PROGRAM OF LABORATORY PRACTICES

Practice 1.- External organization of Chelicerates and Crustaceans. Recognition of differential morphological characters on specimens of the main groups. Dissection of a Mantis Shrimp.

Practice 2.- Diversity of Crustaceans. Recognition of differential morphological characters on specimens of the main groups.

Practice 3.- External organization of Myriapods and Hexapods. Recognition of differential morphological characters on specimens of the main groups. Dissection of a cricket.

Practice 4.- Diversity of Hexapods. Recognition of differential morphological characters on specimens of the main groups.

Practice 5.- Observation and interpretation of the anatomy of Cephalocordates (*Branchiostoma lanceolatum*). Observation of oozoids of ascidians (Urochordates). Dissection of a specimen of rainbow trout (Vertebrates).

Practice 6.- Observation of external anatomical characters of specimens of Chondrichthyans and Osteichthyans, and classification of them.

Practice 7.- Observation of external anatomical characters of Urodeles and Anurans (Amphibians), as well as Saurians and Ophidians (Amniotes), and classification of them.

Practice 8.- Observation and interpretation of vertebrae, skulls and girdles of Mammals.

## Methodology

The methodology used in this subject to achieve the learning process is based on students working on the provided information. The function of the teacher is to give them the information or to indicate where they can get it and to help and tutor them 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 students acquire the basic scientific-technical knowledge of the subject, which must be complemented with the personal study.

Practices:

During the practical sessions, the students work with the zoological material in the laboratory (observation of preparations and specimens, study of anatomy and morphology of groups, dissections, identifications of specimens, etc.), complementing their study by means of information and questions posed in the practice script. The objective of the practical classes is to complete and reinforce the zoological knowledge acquired in the theoretical classes. In the practical sessions students are stimulated and they develop empirical skills such as the ability to observe, analyze and recognize the zoological diversity.

Tutorships:

In a complementary way, the students will have additional hours of teacher attention, in order to answer questions, clarify basic concepts and guide them about the documentary sources that have been recommended.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory practices	16	0.64	3, 2, 4, 10
Theoretical classes	34	1.36	1, 7
Type: Supervised			
Tutorships	6	0.24	1, 4, 7, 8
Type: Autonomous			
Analysis and study of bibliographic material	72	2.88	1, 7, 9, 6
Works preparation	15	0.6	9, 8, 5, 6

## Assessment

The evaluation of the subject will be done as follows:

1.- Theoretical exams:

- Partial exams:

There will be two partial exams (one of Artropods and the other of Chordates); each with a weight of 40% in the final grade.

- Final exam:

Students who do not pass any of the two partial exams (minimum score: 5 out of 10) must recover the failed parts in a final exam. Likewise, students who wish to improve the grade of one or both of the parts may do so by taking the final exam; however, the previously obtained grade will be lost. Compensations between the two parts will be only made if the lower grade is 4.0 or higher (on a scale of 0 to 10). The grade corresponding to the theory (the two exams, 40% and 40%) will have a global weight of 80% in the final grade.

2.- Practices:

At the end of each practice, the student will perform an individual test on its contents in the terms indicated by the corresponding teacher.

Each of the parts (Arthropods and Chordates) will have a value of 10% in the final grade. Therefore, the overall weight of the practices will be 20% in the final grade.

Final considerations:

The final grade will be the result of the arithmetic sum of the marks obtained in the different parts [theory (partial or final) + practices] understood as a whole (Arthropods + Chordates) and valued in their corresponding percentages.

To participate in the recovery exam, students must have been previously evaluated in a set of activities the weight of which equals a minimum of two thirds of the total grade of the subject. Therefore, the student will obtain the grade of "Not evaluable" when the evaluation activities carried out have a weight lower than 67% in the final grade.

Students who can not attend an individual exam for a justified cause and provide the corresponding official documentation, will be allowed to take the exam on another date.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Laboratory Exercises	20% of final mark	1	0.04	3, 2, 4, 9, 10, 8, 6
Partial and final exams	80% of final mark	6	0.24	1, 7, 5

## Bibliography

ARTHROPODS:

Armengol, J **et al.**, 1986. *Història natural dels Països Catalans*. Enciclopèdia Catalana. Vol. 9.

Barrientos, J.A. y R. Rodríguez, 1993. *Curso práctico de Zoología. II. Artrópodos*. Oikos-Tau.

Beaumont, A. y P. Cassier, 1970. *Biologie animale. Des protozoos aux metazoos epiteloneures*. Dunod Université.

Blas, M. **et al.**, 1986. *Història natural dels Països Catalans*. Enciclopèdia Catalana. Vol. 10.

Brusca, R.C. y Brusca, G.J., 2005. *Invertebrados*. 2ª ed. MacGraw-Hill. Interamericana.

Grassé, P.P., 1982. *Manual de Zoología. I i II. Invertebrados*. Toray-Masson.

Nieto, J.M. y M.P. Mier, 1985. *Tratado de Entomología*. Omega.

Selfa, J. y J. Pujade-Villar, 2002. *Fonaments de Zoologia dels Artròpodes*. Educació. Materials 53. Universitat de València.

#### CHORDATES:

Beaumont, A y Cassier, P. *Biologie Animale. Les Cordés. Anatomie Comparée des Vertébrés*. Dunod Université.

Hildebrand, M. *Analysis of Vertebrate structure*. John Wiley & Sons.

Kardong, K. V. *Vertebrados. Anatomía comparada, función y evolución*. McGraw-Hill. Interamericana.

Kent, G. C. *Comparative anatomy of the Vertebrates*. Mosby.

Pough, F. H; Janis, C. y Heiser, J. B. *Vertebrate life*. 7ª edición (2005). Pearson Education.

Romer, A. S.y Parsons,T. S. *The Vertebrate Body*. Saunders.

Weichert C.K. y Presch W. *Elementos de anatomía de Cordados*. McGraw-Hill. Interamericana.

#### Web pages:

- Adena/World Wildlife Found: <http://www.wwf.es/>
- Animal Diversity Web: <http://animaldiversity.ummz.umich.edu/>
- ARKive, Images of life on Earth: <http://www.arkive.org>
- Aula Virtual de l'Autònoma Interactiva: <https://cv2008.uab.cat>
- Biodidac: <http://biodidac.bio.uottawa.ca>
- California Academy of Sciences: <http://www.calacademy.org>
- Comissió Internacional de Nomenclatura Zoològica: <http://www.iczn.org/>
- FishBase: <http://www.fishbase.org>
- Museu Nacional de Ciències Naturals de Madrid (CSIC): <http://www.mncn.csic.es/>
- Natural History Museum, Londres: <http://www.nhm.ac.uk/>