Universitat Autònoma de Barcelona

2020/2021

Zoology Extension Course

Code: 100791
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OB	2	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

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

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- 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.
- Identify and classify living organisms.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Obtain, manage, conserve and observe specimens.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- 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. Analyse a situation and identify its points for improvement.
2. Analyse and interpret animal diversity and the phylogenetic lines of the metazoa.
3. Analyse the sex- or gender-based inequalities and the gender biases present in one's own area of knowledge.
4. Apply dissection methods to observe and analyse the internal anatomy of representative samples of the principal animal groups.
5. Apply methods for identifying and classifying the principal animal groups.
6. Apply techniques for the study of animal anatomy.
7. Be able to analyse and synthesise.
8. Be able to organise and plan.
9. Critically analyse the principles, values and procedures that govern the exercise of the profession.
10. Describe and identify the levels of organisation of animals.
11. Develop a sensibility towards environmental issues.
12. Identify and classify animals from morphological features.
13. Propose new methods or well-founded alternative solutions.
14. Propose projects and actions that incorporate the gender perspective.
15. Propose viable projects and actions to boost social, economic and environmental benefits.
16. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
17. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
18. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
19. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

20. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.

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.-Vertebrates. Definition. Interpretation of its structure in an evolutionary framework. General diversity. General considerations about its classification.

Unit 14.- "Agnathans": the Vertebrates without jaws. Myxiniformes. Petromyzontiformes. 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.

Unit 15.- The conquest of the terrestrial environment. Sarcopterigii: 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. *Archeopteryx* 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 PRACTICES

Field practice:

Practice 1.- Arthropod sampling techniques

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

Practice 3.- Diversity of Pancrustaceans (Hexapods and Crustaceans). Recognition of differential morphological characters on specimens of the main groups.

Practice 4.- Observation and interpretation of the anatomy of Cephalochordates and Urochordates. General characteristics of Vertebrates: dissection of a trout. External anatomy and diversity of Chondrichthyans and Osteichthyans.

Practice 5.- External anatomy and diversity of Amphibians (Urodeles and Anurans), and Squamates ("Saurians" and Ophidians).

Practice 6.- Anatomy of Birds and Mammals.

*Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents.

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.

Seminars:

In the seminars, students work on the scientific-technical knowledge presented in the master classes to complete their understanding and deepen in it, by developing various activities such as the analysis and discussion of videos on zoological topics, the resolution of issues related to the topics covered, analysis of 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:

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.) and in the field (terrestrial sampling techniques), 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 themabout the documentary sources that have been recommended. The schedule of individualized tutorships will be specified with the teachers through the virtual campus.

*The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field practices	4	0.16	9, 2, 1, 5, 10, 12, 13, 19, 16, 17, 11, 8
Laboratory practices	12	0.48	9, 5, 4, 6, 10, 12, 19, 16, 11, 8
Seminars	6	0.24	9, 2, 15, 19, 18, 16, 17, 11, 7, 8
Theoretical classes	28	1.12	2, 10, 12
Type: Supervised			
Tutorships	6	0.24	2, 6, 10, 11
Type: Autonomous			
Problems solving and works preparation	20	0.8	2, 1, 5, 10, 13, 20, 18, 16, 17, 11, 7, 8
Study and reading of bibliographic material	65	2.6	9, 2, 10, 12, 20, 11, 8

Assessment

This subject has a continuous evaluation process throughout the course that includes more than three evaluation activities of different types. None of them represents more than 50% of the final grade.

1.- Seminars:

Both the work to be presented on the seminar days and the activities (group and individual) that take place throughout the seminar are evaluated. This activity has no possibility of recovery. The grade corresponding to the seminars has an overall weight of 20% of the final grade.

2.- Theory:

- Partial exams: These exams assess individually the knowledge gained by students in the subject, as well as their ability to analyze, synthesize, and critical reasoning. The exam has a part of test-type questions and another of conceptual questions, schemes, etc. There will be 2 partial eliminatory exams, one corresponding to the part of Arthropods and the other to that of Chordates.

- Final exam: Students who do not pass one of the two partial exams (minimum mark: 5 out of 10), will have the opportunity to recover the part or parts not passed in the final exam. Likewise, students who wish to improve their grade in one or both parts may do so by taking the final exam. However, taking the final exam implies renouncing the grade previously obtained. The mark corresponding to each of the two exams has a weight of 30% 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 superior to 4.

3.- Practices: Attendance at laboratory and field practices is mandatory. At the end of each practice, students will take an individualized test that assesses the use and achievement of the specific skills of each session. Each of the parts (Arthropods and Chordates) will have a value of 10% in the final grade. Therefore the overall weightof the practices will be 20% inthe final grade. This activity has no possibility of recovery.

Final considerations:

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

To participate in the recovery, students must have been previously assessed in a set of activities whose weight is equivalent to a minimum of two thirds of the total grade of the subject. Therefore, students will obtain the grade of "Not evaluable" when the evaluation activities carried out have a weighting of less than 67% in the final grade.

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

*Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of practices	20% of final mark	1.5	0.06	2, 5, 4, 6, 12, 19, 7, 8
First partial (final I)	30% of final mark	2	0.08	2, 10, 12, 15, 20, 7
Individual and group exercices/activities in seminars	20% of final mark	3.5	0.14	9, 2, 3, 1, 12, 13, 14, 18, 16, 17, 11, 7, 8
Second partial (final II)	30% of final mark	2	0.08	2, 10, 12, 15, 20, 7

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

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Grimaldi D. and Engel M.S. 2005. Evolution of the Insects. Cambridge University Press. 1st ed.

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Hickman C.P. ***et al.*** 2009. Principios Integrales de Zoología. McGraw-Hill. 14ª ed.
Foelix R.F. 2011. Biology of Spiders. Oxford University Press. 3rd ed.

CHORDATES:

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De Iuliis G, Pulerà D. The dissection of Vertebrates. (accessible on-line i descarregable en pdf des del web de la Biblioteca de la UAB)

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

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

Kent GC. *Comparative anatomy of the Vertebrates*. Mosby.

Pough FH,Janis C, Heiser JB. *Vertebrate life*. 7ª edición (2005). Pearson Education.

Romer AS, Parsons TS. *The Vertebrate Body*. Saunders.

Weichert CK, 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

• Biodidac: http://biodidac.bio.uottawa.ca

• California Academy of Sciences: http://www.calacademy.org

• Comissió Internacional de Nomenclatura Zoològica: http://www.iczn.org/

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

• FishBase: http://www.fishbase.org

• IberoDiversidad Entomológica Accesible: http://sea-entomologia.org/IDE@/

• Museu Nacional de Ciències Naturals de Madrid (CSIC): http://www.mncn.csic.es/

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

• The Ant Wiki: https://www.antwiki.org/wiki/Welcome_to_AntWiki

• The Bug Guide: https://bugguide.net/node/view/15740

• Zoología de los artrópodos (wikiversidad):
https://es.wikiversity.org/wiki/Zoolog%C3%ADa_de_los_artr%C3%B3podos