

Animal Biology

Code: 100991
ECTS Credits: 6

Degree	Type	Year	Semester
2500502 Microbiology	FB	1	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: No
Some groups entirely in Spanish: No

Teachers

Ana Morton Juaneda
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Prerequisites

It is recommended to review the subjects of animal diversity (Zoology) and general concepts of genetics, evolution and cell biology studied in high school. It is also recommended to review the lessons studied in high school, about the structure (Anatomy) and the functioning (Physiology) of animal living things, particularly humans.

Objectives and Contextualisation

The course complements the introduction to the study of the morphological and anatomical diversity of the different groups of animals with a description of the function of the major physiological systems of animals, particularly humans. Both approaches complement the systematic and phylogenetic perspectives with the anatomical and functional of the course. By the end of this course student will be able to:

1. Situate each animal group in an eco-physiological context, valuing it in relation to the number of species, habitat and way of life, position within the ecosystems and importance in relation to their interest in the applied sciences and economics.
2. Understand the organization and biological bases of the main physiological systems, understood as highly interrelated, regulated and integrated entities.

Goals:

- (1) To introduce to the student the main structuring concepts of the science of Zoology, with the aim to:
 - (I) understand the systematics and phylogenetic relationships among the major animal groups as a result of evolutionary and adaptive processes.
 - (II) know the main levels of organization of animals and their architectural patterns.

(2) To know the main groups of animals according to:

(I) its morphological characteristics,

(II) biological cycles,

(III) ecological importance, and

(IV) interactions with man.

(3) To achieve the basic knowledge of animal physiology, including:

(I) to know the organization and the anatomical and functional basis of animal physiological systems, with special attention to Humans.

(II) to identify the role and importance of major regulatory or control systems.

(III) to know the main biophysical, cellular, molecular and biochemical bases of the physiological systems to understand their function.

(IV) to understand the different physiological systems as highly interrelated and integrated entities.

(V) to understand the physiology of animal organisms as a basis for the development of studies and microbiological applications.

Skills

- Communicate orally and in writing.
- Develop critical reasoning skills in the field of study and in relation to the social context.
- Display sensibility towards environmental, health and social matters.
- Identify and solve problems.
- Obtain, select and manage information.
- Recognise the different levels of organization of living beings, especially animals and plants, diversity and bases of regulation of vital functions of organisms and identify mechanisms of adaptation to the environment.
- Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.
- Work individually or in groups, in multidisciplinary teams and in an international context.

Learning outcomes

1. Communicate orally and in writing.
2. Develop critical reasoning skills in the field of study and in relation to the social context.
3. Display sensibility towards environmental, health and social matters.
4. Establish the principles behind the functioning of physiological processes in animals and plants, with a view to using them in practice.
5. Identify and solve problems.
6. Interpret the functioning of animal organs and systems in relation to each animal's habitat and/or situation.
7. Know and integrate the functional processes of animal organisms.
8. Know and interpret animal and plant diversity, its origin and its evolution.
9. Know and interpret the biological cycles of the animal groups.
10. Know the morphology and bionomy of the principal animal taxons.
11. Obtain, select and manage information.
12. Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.
13. Work individually or in groups, in multidisciplinary teams and in an international context.

Content

MODULE I: Fundamentals of Zoology

- **Definition of Zoology.** The concept and characteristics of an Animal. Current situation of Animals in the World of living organisms. Concepts of species. Specific qualitative and quantitative variability. Reproductive barriers. The process of speciation: modes and causes. Biodiversity. Concept and notions of Zoogeography. Zoogeographic zones. Cosmopolitan and endemic species.
- **Basic Principles of Zoology.** Anatomy and Morphology. Concept of Anatomy. Morphological study. Concept of Homology and Homoplasia. Ordering the Animal World: Phylogeny. Systematics. Taxonomy: concept of taxon. Nomenclature: rules of animal nomenclature. Current phylogenetic view of Animals. The architectural pattern of Animals: Structural levels of organization. Archetype and plans of Animal organization. Concept and types of symmetry.
- **Animal reproduction.** Reproduction and sexuality. Modes of asexual and sexual reproduction. Parthenogenesis. Adaptive meaning of different reproductive patterns.
- **Animal development.** Embryonic development. Ontogeny. Segmentation. Gastrulation. Formation of the mesoderm. Coelom: importance of the appearance of the coelom. Organogenesis. Postembryonic development. Direct and indirect development. Metamorphosis. Life cycles.

MODULE II: zoological diversity

- **Porifera.** Cellular organization. Structural types. Representative groups. Evolutionary organization of groups. Functional adaptations to the aquatic environment.
- **Diploblastic metazoans.** Cnidarians. General characters. Cellular elements. Representative groups. Biological cycles.
- **The Triploblastic level.** Lophotrochozoan Protostomes. Platyhelminthes. Basic characters. Adaptations of the different groups to parasitism. Life cycles of parasitic species.
- **Annelids.** Basic characters of Annelids. Main groups and adaptations to different habitats. Importance and utilization of annelids by man.
- **Molluscs.** Basic characters of the group. Importance of the shell and their evolution. Main groups and adaptations to different habitats.
- **Ecdysozoan Protostomes.** Nematodes. Basic characters. Adaptations to different ways of life. Most representative life cycles.
- **Arthropoda.** General characters. Structure and importance of the cuticle. Basic elements of a segment. Tagmosis. General characteristics of the different groups of Arthropods and their environmental adaptations.
- **Hexapoda (Insects).** Basic characters. Importance of the group. Main groups. Insects and Man.
- **Deuterostomes. Echinoderms.** General organization of the group and adaptive diversification.
- **Chordates.** Exclusive characters of the Chordates. Compared characters of Urochordata and Cephalochordata. Biology of the two groups.
- **Diversity of Vertebrates I.** Agnatha and Gnathostomata. General characters compared. Diversity and environmental adaptations.
- **Diversity of Vertebrates II.** Amphibians, Reptiles, Birds and Mammals. General compared characters. Diversity and environmental adaptations.

MODULE III: Fundamentals of Animal Physiology

- **Introduction to Animal Physiology.**
- **Intercellular communication.**
- **Electrical excitability I: neurons.**
- **Electrical excitability II: muscle.**
- **Fluid compartments. Blood.**
- **Cardiovascular physiology.**
- **Physiology of breathing.**
- **Renal function.**
- **Physiology of digestion.**
- **Endocrine system.**
- **Reproduction.**
- **Nervous system.**

Methodology

The methodology used in this course to achieve the learning process is based on students working with available information. The function of the professor is to give the information or indicate where he can get it, guiding and supervising the student during the learning process. To achieve this goal, the course is based on the following activities:

Lectures:

With these classes the students acquire the basic scientific-technical knowledge of the course that must be complemented with personal study of the topics explained.

Seminars:

The aim of the seminars is to promote the capacity for analysis and synthesis, critical reasoning and the capacity to solve problems. In the seminars, the scientific-technical knowledge exposed in the lectures is worked on to complete and deepen their understanding, developing various activities: videos on zoological themes, resolution of issues related to the topics covered, analysis of ecophysiological and zoological information, etc. ., analysis, discussion and resolution of physiology problems, working in small groups around topics of special interest in animal physiology, zoology, and microbiology.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Lectures	36	1.44	7, 9, 8, 10, 6
Seminars and case studies	9	0.36	4, 7, 8, 6
Type: Supervised			
Individuals and group tutorials	6	0.24	4, 8, 5, 6, 1, 13, 3
Seminar preparation	2	0.08	11, 13, 12
Type: Autonomous			
Bibliographic research	6	0.24	11, 12
Case studies	7	0.28	2, 5, 1, 13, 12
Personal study and solve problems	59	2.36	4, 7, 9, 8, 10, 5, 6, 11
Reading texts	6	0.24	2, 11, 12
Written Reports	10	0.4	11, 1, 13, 12

Evaluation

There is a continuous evaluation process throughout the course that includes more than three evaluation activities, of different typologies, distributed throughout the course, and none of the activities represents more than 50% of the final grade.

The evaluation of this course is done independently by the two parts of the subject, Zoology and Animal Physiology, and each part represents a 50% of the course. For each part, the evaluation is carried out according to the following criteria:

Evaluation of seminars:

There are evaluations of:

- Individual or group written reports that should be presented during the seminars or on subsequent dates.
- Group and/or individual tests, which can be developed throughout the seminars.

The mark corresponding to the seminars has a global weight of 25% in the part of Zoology and 20% in the part of Animal Physiology.

In this activity there is no chance for re-assessment.

Evaluation of theory:

Partial exams:

The knowledge acquired by the students during the course is evaluated individually, as well as their capacity for analysis, synthesis and critical reasoning.

In both parts of the subject, Animal Physiology and Zoology, 2 partial exams are done. The minimum mark of each partial exam in each part of the subject is: 5 over 10 in Zoology, and 4.5 over 10 in Animal Physiology.

The mark corresponding to theory has a global weight of 75% in the part of Zoology and 80% in the part of Animal Physiology.

Retaking exam:

This exam will have to be taken by the students who have not passed one or more partial exams, and those who have obtained a final mark of theory in Animal Physiology below 5 over 10.

Final considerations:

The two parts of the subject will be weighted and the subject will be passed only when the mark of each part equals or is 5 over 10. The minimum global mark to pass the subject is 5 over 10.

Students that not passed one of the two parts will be considered as 'not passed'. Those students who have failed the course before only have to evaluate the concrete part they have not passed.

"To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two thirds of the final score of the course or module. Thus, the student will be graded as **Non-evaluable**" if the weighting of all conducted evaluation activities is less than 67% of the final score".

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Seminars Animal Physiology	10%	1.5	0.06	4, 7, 2, 5, 6, 11, 1, 13, 3, 12
Seminars Zoology	12,5%	1.5	0.06	4, 7, 9, 8, 10, 2, 5, 6, 11, 1, 13, 3, 12
Theory Animal Physiology	40%	3	0.12	4, 8, 5, 6, 1
Theory Zoology	37,5%	3	0.12	4, 7, 9, 8, 10, 5, 6, 1

Bibliography

References of Zoology

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Barnes RSK, Calow P, Olive PW (1993). *The Invertebrates: a new synthesis*. Ed. Blackwell Scientific Publications

Brusca RC, Brusca GJ (2005). *Invertebrados*. 2a ed. Ed. MacGraw-Hill. Interamericana.

Grasse PP (1982). *Manual de Zoología. I i II. Invertebrados*. Ed. Toray-Masson.

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Meglitsch L (1978). *Zoología de Invertebrados*. Ed. H. Blume.

Weichert CK (1981). *Elementos de anatomía de Cordados*. McGraw-Hill.

Referències generals (evolució)

Dawkins R (1989). *El relojero ciego*. Ed. Labor

Dawkins R (2008). *El cuento del antepasado*. Ed. A. Bosch

Fontdevila A, Moya A (2003). *Evolución: origen, adaptación y divergencia de las especies*. Ed. Síntesis.

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Widmaier EP, Raff H, Strang KT. *Vander's Human Physiology: The Mechanisms of Body Function*. McGraw-Hill Higher Education, 13a ed, 2013.

Fox SI. *Fisiología Humana*. McGraw-Hill Educación, 13a ed, 2014.

Pocock G, Richards CD, Richards DA. *Human Physiology*. Oxford University Press, 4a ed, 2013.

Tresguerres J.A.F. *Fisiología Humana*. McGraw-Hill. 4a ed, 2010.

Tortora GJ, Derrickson BH. *Principles of Anatomy and Physiology*. Wiley, 15a ed, 2017.

Koeppen BM, Stanton BA. *Berne & Levy Physiology*. Elsevier, 7a ed, 2018.

Web pages

Aula Virtual de l'Autònoma Interactiva: <https://cv2008.uab.cat/>

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