

Zoology

Code: 100851
ECTS Credits: 6

Degree	Type	Year	Semester
2500251 Environmental Biology	FB	1	2

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

Other comments on languages

Part of the course is taught in Catalan and part in Spanish.

Prerequisites

It is recommended to review the concepts related to Zoology of the Biology course studied at high school.

To attend the practices of this course, the student must justify having passed the biosafety and security tests that can be found in the Virtual Campus and has to know and accept the Laboratory operating of the Faculty of Biosciences.

Objectives and Contextualisation

Throughout this course, student must acquire the theoretical and practical knowledges to have a vision as complete as possible of Zoological knowledge bases and the diversity of non-arthropod invertebrate animals from anatomical, functional, systematic and phylogenetic perspectives.

Equally, it should allow placing each animal group in an ecological context, in relation to the number of species, habitat and way of life, position within the ecosystems as well as their importance in relation to their interest in applied sciences and of the environment and economics.

The specific training objectives are:

- To introduce 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 the architectural patterns of non-arthropod invertebrates.
- To transfer knowledge about the morphological characteristics, life cycles, the ecological importance and the interactions with the man of the main groups of non-arthropod invertebrates.

Skills

- Adopt an ethical stance.
- Communicate efficiently, orally and in writing.
- Describe, analyse and interpret the vital adaptations and strategies of the principal groups of living beings.
- Develop analysis and synthesis skills.
- Develop strategies of analysis, synthesis and communication in order to teach biology and environmental studies.
- Identify organisms and recognise the different levels of biological organisation.
- Recognise and analyse phylogenetic relations.
- Sample, characterise and manipulate populations and communities.

Learning outcomes

1. Adopt an ethical stance.
2. Communicate efficiently, orally and in writing.
3. Develop analysis and synthesis skills.
4. Identify the large animal groups and their phylogenetic relationships.
5. Know and interpret the development, growth and biological cycles of the principal animal taxons.
6. Observe, handle and conserve animal specimens and populations.
7. Recognise the basic principles of animal biology that must be conveyed in the field of secondary education.
8. Recognise the molecular, genetic, tissue- and organism-based levels of organisation.

Content

I. INTRODUCTION TO ZOOLOGY: BASIC CONCEPTS:

Lecture 1.- Definition and objectives of Zoology. Definition and characteristics of an Animal. Current situation of Animals in the World of living organisms. Brief history of Zoology.

Lecture 2.- Species and speciation. The concepts of Species. Specific qualitative and quantitative variability. Reproductive barriers. The process of speciation: modes and causes. Zoogeography: zoogeographic zones. Current biodiversity and extinctions.

Lecture 3.- Basic principles of Zoology. The concept of Anatomy. Anatomical methods: Morphometry, Dissection, Organography. The concept of Morphology. Homology and Homoplasy. Convergence and Parallelism. The architectural pattern of Animals. Levels of organization. The concept and types of symmetry. Cephalisation. The concept of segmentation (metamerism) and serial repetition (pseudo-metamerism).

Lecture 4. - Ordering of the Animal world. Taxonomy: the concept of Taxon. Taxonomic characters. Phylogeny Systematic. Relations between taxonomic groups. Taxonomic schools. Nomenclature: rules of Animal nomenclature. The current Phylogeny of the Animal world.

Lecture 5.- Animal reproduction. Asexual reproduction and modes. Sexual reproduction and modes. Types of gametes and gametogenesis. Internal and external fertilization. Parthenogenesis variants. Adaptive meaning of the different reproductive patterns.

Lecture 6.- Embryonic development. The concept of Ontogeny. Types of eggs based on distribution of vitellus and cytoplasm. The Segmentation and modes. The formation and types of Blastulas. Gastrulation: concept and formation of Gastrulas. The formation of Mesoderm and Coelom. Acoelomates, Pseudocoelomates and Coelomates. Characteristics of Protostomes and Deuterostomes. Oviparity and Viviparity; modes of Viviparity Genetic control of development: homeopathicgenes.

Lecture 7.- Post-embryonic development. Direct and indirect development. Metamorphosis: concept and modes. Larval characters. Main types of larvae. Importance of the study of larvae in Phylogeny. The concept of Lophotrochozoans and Ecdysozoans. The concept of Neoteny and Pedogenesis. Indirect and direct life cycles. Life cycles of parasitic animals.

II. PROTOZOA:

Lecture 8.- Unicellular organization. Shape, size and structure of Protozoa. Reproduction and life cycles. Main groups. Protozoa as the origin of Metazoa.

III. STRUCTURAL ORGANIZATION OF ANIMALS. DIVERSITY:

Lecture 9.- Basal Metazoans: Porifera. Cell types. Reproduction and development. Calcareans, Hexactinellids and Demosponges.

Lecture 10.- Diploblastic Metazoans. Cnidarians. Cell types and histology of the group. Structure of polyps and jellyfish. Life cycles. Organization of Hydrozoans, Scyphozoans and Anthozoans. Brief introduction to Ctenophores.

Lecture 11.- Bilateral Metazoans. Lophotrochozoan Protostomes. The concept of Lophotrochozoan. General characteristics of Platyhelminthes. Turbellarians, Monogeneans, Trematodes and Cestodes. Life cycles of Trematodes and Cestodes.

Lecture 12.- Rotifers. General characteristics. **Lophophorata:** fundamental characteristics, organization of Bryozoans.

Lecture 13.- Annelids. Structural organization of an Annelid. Metamerism in Annelids. Organization of a metamere. Organization model of Polychaetes, Oligochaetes and Hirudineans.

Lecture 14.- Molluscs. Structural characteristics of the group. Head, foot and visceral mass. The mantle. Importance of the shell and its evolution. Diversification and adaptive capacities.

Lecture 15.- Main groups of Molluscs. Gastropods: general characteristics and interpretation of flexion and torsion. Bivalves: Morphology and Biology. Cephalopods: general characteristics: functional and adaptive correlations.

Lecture 16.- Ecdysozoan Protostomes. Nematodes. General characteristics. Life cycles. Groups of medical, veterinary and phytosanitary interest.

Lecture 17.- Deuterostomes. Echinoderms. Characteristics. Organization, biology and adaptive diversification of the different groups. Brief introduction to the Hemichordates.

PRACTICAL CLASSES:

Laboratory practices:

Practice 1: Observation of Fresh-Water Microfauna and Protozoans. Observation and recognition of Poriferans and Cnidarians.

Practice 2: Observation and recognition of Platyhelminthes and Nematodes.

Practice 3: Observation and recognition of Annelids.

Practice 4: Observation and recognition of Molluscs and Echinoderms.

Field practice:

Practice 5: Sampling techniques and observation of marine invertebrates.

Methodology

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

Lectures:

In these classes the student acquires the basic scientific-technical knowledge of the course that must be complemented with personal study of the topics explained.

Seminars:

In the seminars, students work in the scientific and technical knowledge exposed in the lectures to complete and deepen their understanding, developing various activities: analysis and discussion of videos on zoological topics, resolution of issues related to the topics discussed, analysis of zoological information, etc.

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

Practices:

During the practice sessions students work the zoo material in the laboratory (observation of preparations and specimens, study of anatomy and morphology of groups, dissections, identification of specimens, etc.) and in the field (sampling techniques of invertebrate fauna), and they complement it with the study and the questions raised in the practice script.

The objective of the practical laboratory and field classes is completed and reinforced the zoological knowledge acquired in the theoretical classes and seminars. During the practical sessions, students' empirical skills are stimulated and developed, such as the ability to observe, analyse and recognize zoological diversity.

Tutorials:

The objective of these sessions is to solve doubts, to review basic concepts not explained in classes and to guide about the sources consulted by the students. The schedule of individualized tutorials is specified with the professor through the virtual campus.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Fieldwork	4	0.16	1, 2, 5, 3, 4, 6, 8, 7
Laboratory practical classes	8	0.32	2, 5, 3, 4, 6, 8, 7
Lectures	33	1.32	5, 4, 8, 7
Seminars	7	0.28	2, 5, 3, 4, 8
Type: Supervised			
Tutorships	6	0.24	2, 5, 3, 4, 8, 7
Type: Autonomous			
Problem solving	52	2.08	5, 4, 8
Written Reports, answer to questions	32	1.28	2, 5, 3, 4, 8

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.

Evaluation of seminars:

Both the short written reports (questions) that should be presented during the seminar days and the evaluative tests (in group and individual) that take place throughout the seminar are evaluated.

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

The grade corresponding to the seminars has a global weight of 25% of the final grade.

Evaluation of the exams:

Partial exams:

In this part, the knowledge acquired by the students during the course is evaluated individually, as well as their capacity for analysis and synthesis, and critical reasoning. The exam has part of test questions and other of conceptual questions, schemes, etc.

There are two partial exams of the course, each with a weight of 30% of the overall mark.

Final exam:

Students who do not pass one of the two partial exams (minimum grade: 5 out of 10) can re-asses the exam failed in the final exam. Likewise, students who wish to improve a grade in one or both of the parts can do the final exam, but they will lose the previous grade.

The corresponding grade for each of the two exams weighs 30% of the final grade. To be able to make the average with the other evaluative activities (seminars and practices) the average mark of the two exams must be equal to or greater than 4.

Evaluation of the practices:

Attendance at lab sessions and field practices is mandatory.

After each laboratory practice the students perform an individualized test that assesses the use and achievement of the specific skills of each practice (10% of the final grade).

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

In addition, a final visu test of a list of invertebrate species that students will have seen in theory classes, seminars or practices and must recognize, will be done (5% of the final grade).

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

The overall evaluation of the practices has a weight of 15% of the final grade.

Final considerations:

The minimum global grade needed to pass the course is 5 out of 10.

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 "No Avaluable" if the weighthin of all conducted evaluation activities is less than 67% of the final score.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Evaluation of laboratory practices and visu exam	15%	1.5	0.06	1, 2, 5, 3, 4, 6, 8, 7
Partial exam I (final exam I)	30%	1.75	0.07	2, 5, 3, 4, 8
Partial exam II (final exam II)	30%	1.75	0.07	2, 3, 4, 8
individual and group-work evaluations at the seminars.	25%	3	0.12	1, 2, 5, 3, 4, 8

Bibliography

References:

- BARNES (2009). Zoologia de los Invertebrados. Ed. MacGraw-Hill. Interamericana. Setene edició.
- BARNES, R.S.K, CALOW, P. i OLIVE, P.J.W. (1988). The Invertebrates: a new synthesis. Ed. Blackwell Scientific Publications.
- BRUSCA R.C. i BRUSCA G.J. (2005). Invertebrados. Ed. MacGraw-Hill. Interamericana. Segunda edició.
- GRASSE, P.P. (1982) Manual de Zoología. I. Invertebrados. Ed. Toray-Masson.
- HICKMAN, C.P., ROBERTS, L.S., KEENS, L., LARSON, A., L'ANSON, M., EISENHOUR, D.J. (2008). Principios integrales de Zoología. Ed. Interamericana. Catorzena edició (Disponible en versió digital a la web de la biblioteca).
- HISTÒRIA NATURAL dels Països Catalans. Vol. 8. Ed. Enciclopèdia Catalana.
- MEGLITSCH, P.A. i SCHRAM, F.R. (1991) Invertebrate Zoology. Oxford University Press, New York.
- MUNILLA, T. (1992). Prácticas de Zoología General. I. Invertebrados no Artrópodos. Ed. Oikos-Tau.

Web pages:

- 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/>
- 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>