

Zoology

Code: 100786
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OB	1	2

Contact

Name: Ana Morton Juaneda
Email: Ana.Morton@uab.cat

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.

Teachers

Francesc Muñoz Muñoz

Prerequisites

There are not official prerequisites, but it is recommended to review the concepts related to Zoology of the Biology course studied at high school.

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

- Analyse and interpret the development, growth and biological cycles of living beings.
- 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. Analyse and interpret the development, growth and biological cycles of animals.
3. Apply dissection methods to observe and analyse the internal anatomy of representative samples of the principal animal groups.
4. Apply methods for identifying and classifying the principal animal groups.
5. Apply techniques for the study of animal anatomy.
6. Be able to analyse and synthesise.
7. Be able to organise and plan.
8. Describe and identify the levels of organisation of animals.
9. Describe the principles and methods of animal classification.
10. Develop a sensibility towards environmental issues.
11. Develop independent learning strategies.
12. Identify and classify animals from morphological features.
13. Work in teams.

Content

I. INTRODUCTION TO ZOOLOGY. BASIC CONCEPTS:

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

Lecture 2.- The concepts of Species. Specific qualitative and quantitative variability. Reproductive barriers. The process of speciation: modes and causes. Evolution: concepts of microevolution and macroevolution. Current biodiversity and extinctions.

Lecture 3.- Ordering of the Animal world. Taxonomy: the concept of Taxon. Taxonomic characters. Nomenclature: rules of Animal nomenclature. Phylogeny Systematic. Principles of classification: Anatomy and Morphology. Homology and Homoplasy. Evolutionary systematic. Numeric Taxonomy. Phylogenetic systematic.

Lecture 4. - The architectural pattern of Animals. Levels of organization. The concept of Symmetry and modes. Cephalisation. Embryo layers and body cavities. Concept and types of Metamerism.

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: homeopathic genes.

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.

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.

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.

If possible, during the second part of the course, there will be seminar sessions where the students will present their work in English.

Practices:

Laboratory 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.

Field practices: in this practice the students will know the main methods of wildlife sampling in the sea environment, and will recognize and identify the animal organisms "in situ".

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 practices	4	0.16	2, 1, 4, 5, 8, 11, 12, 10, 6, 7, 13
Laboratory practical classes	8	0.32	4, 3, 5, 8, 12
Lectures	32	1.28	2, 1, 4, 9, 8
Seminars	6	0.24	2, 1, 4, 5, 9, 8
Type: Supervised			

Tutorials	5	0.2	2, 1, 4, 5, 9, 8
Type: Autonomous			
To study and to solve problems	50	2	2, 1, 4, 5, 9, 8
Written Reports, answer to questions	34.5	1.38	2, 1, 4, 5, 9, 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.

1. Evaluation of seminars:

All written reports that should be presented during the seminar days and the activities (in group and individual) developed during the seminars are evaluated.

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

The grade corresponding to the seminars has a global weight of 20% of the final grade.

2. Evaluation of the exams:

Partial exams:

With these exams, 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.

Final exam:

Students who do not pass one of the two partial exams (minimum grade: 5 out of 10) can re-assess 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.

3. 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 (15% of the final grade).

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

4. Visu test

A final visu test of a list of invertebrate species that students will have seen in theory classes, seminars or practices 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 5% 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 practices	15%	2	0.08	4, 3, 5, 8, 11, 12, 10, 6, 7
Individual and group-works evaluation in the seminars	20%	2.5	0.1	2, 1, 4, 5, 9, 8, 11, 6, 7, 13
Partial exam I (final exam I)	30 %	2.5	0.1	2, 1, 4, 9, 8
Partial exam II (final exam II)	30%	2.5	0.1	2, 1, 4, 9, 8
Visu exam	5%	1	0.04	4, 5, 8, 11, 12, 6, 7

Bibliography

References:

- BARNES (2009). Zoologia de los Invertebrados. Ed. MacGraw-Hill. Interamericana. Setena 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.
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- 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 references:

- 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>