Universitat Autònoma de Barcelona

2022/2023

Biology and Diversity in Non-Arthropod Invertebrates

Code: 100789
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OT	4	1

Contact

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Use of Languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

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Prerequisites

It is recommended to review the general concepts of Zoology and the characteristics of the main groups of invertebrates-non-Arthropoda studied in previous courses.

Objectives and Contextualisation

Throughout this course, student will acquire 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, student will be able to situate 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.

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.
- Control processes and provide services related to biology.
- Develop a sensibility towards environmental issues.
- 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 handling and conserving animal specimens.
6. Apply sampling methods to obtain animal specimens.
7. Apply techniques for the study of animal anatomy.
8. Be able to analyse and synthesise.
9. Be able to organise and plan.
10. Critically analyse the principles, values and procedures that govern the exercise of the profession.
11. Develop a sensibility towards environmental issues.
12. Propose new methods or well-founded alternative solutions.
13. Propose projects and actions that incorporate the gender perspective.
14. Propose viable projects and actions to boost social, economic and environmental benefits.
15. Provide services related to zoology.
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

I. INTRODUCTION

1. Introduction and Phylogeny: Evolutionary and phylogenetic history of the group of non-Arthropod Invertebrates. Traditional classifications and recent evolutionary hypotheses.

2. Diversity of non-Arthropod Invertebrates: Major and minor groups. Groups with doubtful phylogenetic position.

II. BIOLOGY AND DIVERSITY OF MAJOR AND MINOR GROUPS

3. Cnidarians and related groups. Phylum Ctenophora. Characteristics, classification and diversity. Phylogenetic relationships.

4. Platihelmints and related groups: Phylum Xenacoelomorpha. Subphylum Xenoturbellida. Subphylum Acoelomorpha. General characteristics of Acoela and Nemertodermatida. General characteristics, biology and diversification of groups.

5. Platyzoa groups: Phylum Gastrotricha. Phylum Acanthocephala. Phylum Gnathostomulida. General characteristics, biology and relationship with major groups.

6. Annelids and related groups. Update of the Phylum and position of the groups Pogonophora. Myzostomide and Echiura. Phylum Sipunculida. General characteristics, biology and diversification of groups.

7. Groups related to Bryozoa. Phylum Entoprocta. Phylum Phoronida. Phylum Brachiopoda. Phylum Cycliophora. General characteristics, biology and diversification of groups.

8. Ecdysozoa groups: Groups related to Nematodes. Phylum Nematomorpha. Biology and diversity. Phylum Kinorhyncha. Phylum Priapulidae. Phylum Loricifera. General characteristics, biology and diversification of groups. Groups related to Arthropoda. Phylum Tardigrada. Phylum Onichophora. Phylum Chaetognata.

9. Ambulacraria group. Echinoderms and related groups. Phylum Hemichordata. General characteristics, biology and diversity of the group.

II. ADAPTATIONS TO DIFFERENT ECOSYSTEMS

10. Adaptations to the marine environment: Diversity, main adaptations. Mechanisms of fixation and osmoregulation. Competition for space, food and reproduction in these ecosystems.

11. Adaptations to freshwater and terrestrial ecosystems. Diversity, main adaptations. Survival strategies.

PRACTICE PROGRAM

Field Practices: Two field practices to study organisms in the sea environment. If it is possible, the firstsea practice will take place in the Parc Natural del Montgrí, les Illes Medes i el Baix Ter. The second field practice will take place in a sea area of the *Delta del Ebre.*

Laboratory Practices: Identification of organisms in an ecosystem. Identification and classification of non-Arthropod Invertebrates. Methods in laboratory work. Use of non-Arthropod Invertebrates to the applied sciences.

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

Seminars:

The mission of the seminars is to promote the capacity for analysis and synthesis, critical reasoning and the capacity to solve problems. Two types of activities are carried out:

1. Conferences with the presence of professionals working on issues related to non-arthropod invertebrates, where the aim is to bring the world of research and business closer to the students of this last grade course.

2. Group work: students have to present a write report from the scientific-technical knowledge exposed in the lectures. It is characterized by the active work of the students. The students are divided into small working groups, and each group chooses a topic previously agreed upon with the faculty, such as the applicability of some zoological groups (Porifera, Cnidarians, Mollusks, Nematodes or Echinoderms), the evolution of some structure of a taxa, etc. Each student works in a group, not admitting any individual work. Each group performs several follow-up tutorials throughout the development of the work. The works are finally exposed to the rest of the class, by all the members of the groups.

Practices:

In the sea practices, students learn in a practical way how marine fauna is studied, and work on the diversity of the invertebrate fauna of the sampled area.

In the laboratory practical sessions, the zoological material is usedto make a guide of identification of the invertebrates' non-Arthropoda of an ecosystem, and fresh zoological material is identified and classified. The objective of the practical classes is to complete and reinforce the zoological knowledge acquired in the theoretical classes and seminars. In the practical sessions, empirical skills such as the ability to observe, analyze and recognize the zoological diversity are stimulated and developed in the students.

Tutorials:

The objective of these sessions is to solve doubts, review basic concepts not explained in class and guide about the sources consulted by the students. Likewise, these tutorials allow the orientation of the works that will be carried out in the seminars. The schedule of the tutorials is specified with the teaching staff through the virtual campus.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Fieldwork practices (sea)	12	0.48	2, 1, 6, 5, 17, 11, 9
Laboratory practical classes	14	0.56	4, 6, 5, 7, 15, 11, 8, 9
Lectures	21	0.84	2, 7, 15, 20, 17, 11, 8, 9
Seminars	5	0.2	2, 15, 11, 8, 9
Type: Supervised			
Tutorials	6	0.24	2, 8, 9
Type: Autonomous			
To study and to solve problems	50	2	2, 8, 9
Written Reports, answer to questions	33	1.32	2, 3, 1, 7, 15, 20, 19, 18, 16, 11, 8, 9

Assessment

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:

Attendance at seminar sessions is mandatory.

There is an individual evaluation about the conferences, and a group evaluation of the work developed during the seminars. The work and the oral presentation of all the members of each group are also evaluated. The individual and group evaluation weighs 20% of the final grade. In this activity there is no chance for re-assessment.

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 may have multiple choice questions or conceptual questions, diagrams, 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 labsessions and field practices is mandatory.

There are three evaluation activities in the practices:

- *Teaching folder:*

It consists of a series of learning material that is made during the different activities of practices (outputs and laboratory) and that students accumulate throughout the course. These materials can be the elaboration of an identification guide of an ecosystem, files of follow-up of the exits, field notes of the observations, small tests of evaluation on some practice or exit, etc. In this activity there is no chance for re-assessment.

- *Observation record:*

The aim is to identify if the students reach competences of a more attitudinal nature through the observation by the professors of their attitude in the different types of activities that take place in the practices (field trips and laboratory sessions). This activity has a value between -1 and 1 that is added in the practical grade reached by the previous evaluations. In this activity there is no chance for re-assessment.

The final grade obtained in the practices, has a global weight of 20% of the final grade.

Final considerations:

The minimum grade of each one of the activities necessary to make average with the rest of activities is 4. The minimum global qualification necessary 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.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of practices	20%	2	0.08	4, 6, 5, 7, 15, 19, 11, 9
Evaluation of seminars	20%	2.5	0.1	10, 2, 3, 1, 7, 15, 12, 13, 14, 11, 8, 9
Partial exam I (final exam I)	30%	2.25	0.09	2, 7, 15, 20, 18, 16, 17, 11, 8, 9
Partial exam II (final exam II)	30%	2.25	0.09	2, 7, 15, 20, 18, 16, 17, 11, 8, 9

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RIEDL. R. (2000). Fauna y flora del Mar Mediterráneo. Ed. Omega-

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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

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

Software

No specific software is required.