UAB
Universitat Autònoma de Barcelona

Biology and Diversity in Non-arthropod Invertebrates

Code: 100789
Credits: 6

2026/2027

Degree programme	Type	Course
Biology	OP	4

Contact lecturer

Name : Ana Morton Juaneda

Email : ana.morton@uab.cat

Teaching staff

Francesc Xavier Munill Bernardich

Maria Font Rifa

Manuel Perez Sanchez

Group languages

You can consult this information at the end of the document.

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

Throughout this course, students will acquire as comprehensive an understanding as possible of the diversity of non-arthropod invertebrates from an anatomical, functional, systematic and phylogenetic perspective.

Likewise, they will be able to place each animal group within an ecological context, taking into account the number of species, habitat and lifestyle, its position within ecosystems, as well as its importance from the perspective of applied sciences and its economic relevance.

In addition, students will acquire practical knowledge of invertebrate sampling techniques in different environments (marine and inland waters) and of the technological tools used in citizen science programmes aimed at promoting the dissemination of scientific knowledge to society as a whole.

Learning outcomes

1. Be able to analyse and synthesise.
2. Be able to organise and plan.
3. Develop a sensibility towards environmental issues.
4. 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.
5. 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.
6. 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.
7. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
8. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
9. Analyse a situation and identify its points for improvement.
10. Propose new methods or well-founded alternative solutions.
11. Critically analyse the principles, values and procedures that govern the exercise of the profession.
12. Analyse the sex- or gender-based inequalities and the gender biases present in one's own area of knowledge.
13. Propose projects and actions that incorporate the gender perspective.
14. Propose viable projects and actions to boost social, economic and environmental benefits.
15. Apply sampling methods to obtain animal specimens.
16. Apply methods for handling and conserving animal specimens.
17. Apply techniques for the study of animal anatomy.
18. Apply dissection methods to observe and analyse the internal anatomy of representative samples of the principal animal groups.
19. Provide services related to zoology.
20. Analyse and interpret animal diversity and the phylogenetic lines of the metazoa.

Contents

I. INTRODUCTION

1. Introduction and phylogeny: Evolutionary and phylogenetic history of non-arthropod invertebrates. Traditional classifications and the most recent evolutionary hypotheses.

2. Diversity of non-arthropod invertebrates: Major and minor groups. Groups with uncertain phylogenetic placement.

II. BIOLOGY AND DIVERSITY OF THE MAJOR AND MINOR GROUPS

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

4. Platyhelminths and related groups. Phylum Xenacoelomorpha. Subphylum Xenoturbellida. Subphylum Acoelomorpha. General characteristics of the Acoela and the Nemertodermatida. General characteristics, biology and diversity of these groups.

5. Platyzoa groups. Phylum Gastrotricha. Phylum Acanthocephala. Phylum Gnathostomulida. General characteristics, biology and relationships with the major groups.

6. Annelids and related groups. Updated classification of the phylum and phylogenetic position of the groups Pogonophora, Myzostomida and Echiura. Phylum Sipunculida. General characteristics, biology and diversity of these groups.

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

8. Ecdysozoa groups. Groups related to nematodes. Phylum Nematomorpha. Biology and diversity. Phylum Kinorhyncha. Phylum Priapulida. Phylum Loricifera. General characteristics, biology and diversity of these groups. Groups related to arthropods. Phylum Tardigrada. Phylum Onychophora. Phylum Chaetognatha.

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

III. ADAPTATIONS TO DIFFERENT ECOSYSTEMS

10. Adaptations to the marine environment. Diversity and major adaptations. Attachment mechanisms and osmoregulation. Competition for space, feeding and reproduction in these ecosystems.

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

PRACTICAL PROGRAMME

Field practicals

Field trips to study organisms in the marine environment. Whenever possible, the first field trip will take place in the ***Montgrí, Medes Islands and Baix Ter Natural Park.*** The second marine field trip will be carried out in the ***Ebro Delta.***

Laboratory practicals

These practical sessions will be carried out in the UAB laboratories and also in the ***Ebro Delta Natural Park.***

Activities: Identification of organisms from an ecosystem. Identification and classification of non-arthropod invertebrates. Laboratory working methodologies. Applications of non-arthropod invertebrates in applied sciences.

A practical session will also be carried out in the ***non-arthropod invertebrates collection of the Natural Science Museum of Barcelona.***

Learning activities and methodology

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

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. Three 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.

3. Training and monitoring for the use of technologies to promote knowledge of non-arthropod invertebrates in society (technologies of Citizen Science programs).

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.

From this year, the practices are incorporated into the ***Technology for Nature project: Sustainable Zoology and Citizen Science internships*** (Faculty of Biosciences 2024-25), which focuses the methodology on collaborative and transversal work, taking into account the ethical aspects and promote conservation through the minimum possible environmental impact and the use of new technologies and the promotion of citizen participation in science. This is why new methodologies and materials are incorporated, such as sampling with less invasive techniques and devices for organisms, the use of field guides together with freely accessible digital applications, Sampling with less invasive techniques and devices invasive by the organisms, the adaptation of digital platforms for the collection of data and observations and the activity of promoting citizen participation through dissemination campaigns and social networks. For this reason, there will be initial and ongoing training in the use of new technologies and the digital platform, to incorporate these activities into the entire set of practices.

Tutorials:

The objective of these sessions is to solve doubts, review basic concepts not explained in class and guide about the sources consultedby 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.

Assessment

Continuous assessment activities

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

To pass the course, a ***minimum*** mark of 5 points out of 10 possible is required from the sumatori of theory exam + seminars + practical.

ATTENTION: Attendance to the practices and the seminars is mandatory. Non-attendance to practicals and seminars without justification will imply that the student will NOT be able to pass the subject.

1- CONTINUOUS ASSESSMENT

The programmed continuous assessment activities are:

1.1- THEORY

Partial theory exams: Each of the two partial exams will represent 30% of the final grade and will assess the acquired knowledge during the course, as well as analytical and synthesis skills, and critical reasoning. The exam may include short-answer questions, conceptual questions, or schemes.

• To obtain the average of the two partial exams, the minimum grade for each exam must be equal to or higher than 5.0. If the student obtains a grade lower than 5.0 in a partial exam, student will be allowed to re-assess that examen on the day of the recovery exam. In the case of the exam was not re-assessed, the average cannot be calculated with the rest of the course activities.

Re-assessment of theory exam: This exam will be used to re-assess the necessary partial exams.

• To re-assess an exam, the student must have been evaluated in a set of activities equaling at least at least two-thirds of the total evaluation activities of the course.

•For the theory, to be averaged with the practical and seminar activities, the average of the two partial exams must be equal to or higher than 4.0.

• Students who wish to improve a grade in one or both parts can do the final exam, but they will lose the

previous grade.

1.2- SEMINARS

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 grade corresponding to the seminars will represent 20% of the final grade of the course.

• Attendance to seminars is mandatory.

• This activity cannot be re-assessed.

• For the seminars, to be averaged with the other course activities, the average seminar mark must be equal to or higher than 4.0.

1.3 - PRACTICES

Practices represent 20% of the final grade of the course.

Laboratory and field practices: Attendance at lab sessions and field practices is mandatory.

There are two evaluation activities in the practices:

- *Teaching folder:*

It consists of a series of learning materials made during the different activities of practice (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 work, field notes of the observations, work carried out in dissemination to society, small tests of evaluation on some practice, etc. In this activity, there is no chance for reassessment.

- *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 reassessment.

• This activity cannot be reassessed.

• For the practices to be averaged with the other course activities, the average practices mark must be equal to or higher than 4.0.

SUMMARY TABLE OF THE WEIGHT OF EACH COMPONENT:

1st partial theory exam	30%
2nd partial theory exam	30%
Seminars	20%
Practices	20%

2- SINGLE ASSESSMENT

The students who choose the single-assessment option must request it within the terms and forms indicated by the Faculty.

2.1- THEORY

This part represents 60% of the final grade of the course, and will be evaluated through:

Unique theory exam: The unique theory assessment will consist of an exam that will take place on the day of the 2nd partial exam of the course. The exam may include short-answer questions, conceptual questions, or schemes.

Re-assessment of theory exam: The recovery of the single assessment will be the same day and time that the continuous assessment recovery test.

• For the theory, to be averaged with the practical and seminar activities, the grade of the exam must be equal to or higher than 4.0.

• Students who wish to improve the grade of the exam can do the re-assessment exam, but they will lose the previous grade.

• To re-assess an exam, the student must have been evaluated in a set of activities equaling at least at least two-thirds of the total evaluation activities of the course.

2.2- SEMINARS

IMPORTANT: Even if students choose the unique evaluation, they must attend the seminar sessions of this course.

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 grade corresponding to the seminars will represent 20% of the final grade of the course.

• Attendance to seminars is mandatory.

• This activity cannot be re-assessed.

• For the seminars, to be averaged with the other course activities, the average seminar mark must be equal to or higher than 4.0.

2.3- PRACTICES

IMPORTANT: Even if students choose the unique evaluation, they must attend the practice sessions of this course. Practices represent 20% of the final grade of the course.

Laboratory and field practices: Attendance at the laboratory practices is MANDATORY and ESSENTIAL to take the unique theory exam.

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 work, field notes of the observations, work carried out in dissemination to society, small tests of evaluation on some lab practices, field trips, 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.

• Attendance at lab sessions and field practices is mandatory.

• This activity does not have the possibility to be re-assessed.

• For the practices, to be averaged with the other course activities, the average practices mark must be equal to or higher than 4.0.

SUMMARY TABLE OF THE WEIGHT OF EACH COMPONENT:

Unique theory exam	60%
Seminars	20%
Practices	20%

3. IMPORTANT CONSIDERATIONS

To pass the course, the final weighted grade must be 5.0 out of 10 or higher.

Not assessable: Students who complete less than 50% of the assessment activities described above will receive a Not Assessable grade.

Students who do not pass the theoretical component of the course but successfully complete the practical component and/or seminars (obtaining a minimum mark of 5.0 out of 10) will retain this mark for a period of three additional enrolments, although they will be required to re-enrol in the entire course.

Students who are unable to attend an individual assessment activity for justified reasons (such as illness, the death of a family member up to the second degree of kinship, an accident, or holding elite athlete status and having to participate in an official competition or compulsory sporting event, etc.) and who provide the corresponding official documentation to the teaching staff and the degree coordination (official medical certificate explicitly stating the inability to sit the examination, police report, certification from the relevant sports authority, etc.) will be entitled to take the assessment on an alternative date. The degree coordination will ensure that this assessment is organised, following consultation with the teaching staff responsible for the course.

Grade improvement: Students who have passed the theoretical component and obtained a mark higher than 4.0 in both the practical component and the seminars may sit the resit examination in order to IMPROVE THEIR GRADE in the theoretical component. To do so, they must formally renounce their previous mark in writing (by email) and notify the teaching staff responsible for the course at least three days before the resit examination. The mark that will be considered for the theoretical component will be that obtained in the last examination taken by the student.

Use of Artificial Intelligence Technologies: For this course, the use of Artificial Intelligence (AI) technologies is permitted exclusively for support tasks, such as literature searches or information retrieval. Students must clearly identify which parts of their work have been generated using this technology, specify the tools used, and include a critical reflection on how these tools have influenced both the process and the final outcome of the activity. Failure to disclose the use of AI in this assessable activity will be considered a breach of academic integrity and may result in a partial or total reduction of the mark for the activity, or more severe disciplinary sanctions in serious cases.

Irregularities in Assessment Activities: Any irregularity committed during an assessment activity (including academic fraud, plagiarism, or the improper use of Artificial Intelligence (AI), unless such use is expressly authorised in the course guide) that may lead to a significant alteration of the assessment result will result in that assessment activity being awarded a mark of 0. If the course guide establishes that obtaining a minimum mark in that assessment activity is an essential requirement for passing the course, or if multiple irregularities are committed in the assessment activities of the same course, the final grade for the course will be 0. In addition, disciplinary proceedings may be initiated against any student who commits any of these irregularities.

Bibliography

ANDERSON, D. T. (2001). *Invertebrate Zoology. Second edition.* Oxford University Press, Melbourne. 476 pp.

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 edición.

CAMPBELL, A.C. (2009). Guía de la Flora y la Fauna de las costas de España y de Europa. Ed. Omega.

CARERE, C., MATHER, J. (2020) The Welfare of Invertebrate Animals. Ed. Springer.

GRASSÉ, P.P., 1982. *Manual de Zoología. I i II. Invertebrados*. Toray-Masson.

HAYWARD P., NELSON-SMITH, T. I SHIELDS, C. (1998). Flora y fauna de las costas de España yde Europa. Ed. Omega.

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.

MOORE, J. (2006). An introduction to the invertebrates. Cambridge University Press.

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

Web References:

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.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE