

Degree	Type	Year
Environmental Biology	OT	4

## Contact

Name: Ana Maria Morton Juaneda

Email: [ana.morton@uab.cat](mailto:ana.morton@uab.cat)

## Teachers

Francesc Xavier Munill Bernardich

Maria Font Rifa

## Teaching groups languages

You can view this information at the [end](#) of this 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 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.

In addition, student will acquire practical knowledge about the sampling techniques of invertebrates in the marine environment and the technological tools used in citizen science programs aimed at the dissemination of scientific knowledge towards society in general.

## Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Focus on quality.
- Identify and interpret the diversity of species in the environment.
- Identify organisms and recognise the different levels of biological organisation.
- Integrate knowledge of different organisational levels of organisms in their functioning.
- Introduce changes in the methods and processes of the field of knowledge to provide innovative responses to the needs and demands of society.
- Obtain, observe, handle, cultivate and conserve specimens.
- Recognise and analyse phylogenetic relations.
- 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. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Actuar en l'àmbit de coneixement propi avaluant les desigualtats per raó de sexe/gènere.
3. Collect, determine and conserve specimens and collections of invertebrates and vertebrates.
4. Focus on quality.
5. Interpret and recognise the different states of development of invertebrates and vertebrates.
6. Interpret the distribution and the interactions in the environment of invertebrates and vertebrates and their impact on biological diversity.
7. Interpret the evolutionary processes that have led to the diversity of invertebrates and vertebrates.
8. Interpret the origin and functioning of organic structures in the different groups of invertebrates and vertebrates.
9. Introduce changes in the methods and processes of the field of knowledge to provide innovative responses to the needs and demands of society.
10. Recognise the characteristics that distinguish the principal groups of invertebrates and vertebrates.
11. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.

## 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. Plathelminths 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 Cyclophora. 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 Onychophora. Phylum Chaetognata.

9. Ambulacraria group. 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, main adaptations.

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 first sea 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: They will be carried out in the laboratories of the UAB, and also in the PN del Delta del Ebro. Activities: 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.

## Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Fieldwork practices (sea)	12	0.48	1, 2, 11, 4, 6, 9, 3, 10
Laboratory practical classes	14	0.56	4, 6, 3, 10
Lectures	21	0.84	4, 7, 5, 6, 8, 10
Seminars	5	0.2	4, 7, 6, 8, 10
Type: Supervised			
Tutorials	6	0.24	4, 7, 5, 6, 8, 10
Type: Autonomous			
Study and solve problems	50	2	1, 2, 11, 4, 7, 5, 6, 8, 9, 10
Written Reports, answer to questions	33	1.32	4, 7, 5, 6, 8, 10

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 used to 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 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.

## Assessment

### Continuous Assessment Activities

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

### ASSESSMENT

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 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 practice, 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.

- 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:

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

### 1.4- OTHER CONSIDERATIONS

- To pass the course, the final grade must be equal to or higher than 5.0.
- This course allows the use of Artificial Intelligence (AI) technologies exclusively in support tasks, such as bibliographic or information search. The student will have to identify which parts have been generated with this technology, specify the tools used, and include a critical reflection on how they have influenced the process and the final result of the activity. Lack of transparency in the use of AI in this assessable activity will be considered a lack of academic honesty and may result in a partial or total penalty in the grade of the activity, or greater penalties in cases of seriousness.

- NO ASSESSMENTS: It is considered as not assessed the students who carry out less than 50% of the assessment activities described above.
- For students who do not pass the theoretical part of the course but pass the part of practices and/or seminars (obtaining a minimum of 5 points out of 10), this mark will be kept for a three additional registration periods (but student will have to register for the ENTIRE course again).
- The students who could not attend an individual assessment test for justified reasons (such as a health problem, death of a family member, accident, have the status of elite athlete and have a competition or sports activity with compulsory attendance, etc.) and provide the official documentation corresponding to the professor and the coordination of the degree (official medical certificate stating the incapacity to take an exam, police certificate, justification of the competent sports body, etc.), will have the right to take the test in a later date. The coordination of the degree will ensure for the concretion of this test, after consulting with the professor of the course.

## 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%

2.4- OTHER CONSIDERATIONS

- To pass the course, the final grade must be equal to or higher than 5.0.
- For students who do not pass the theoretical part of the course but pass the part of practices and/or seminars (obtaining a minimum of 5 points out of 10), this mark will be kept for a three additional registration periods (but student will have to register for the ENTIRE course again).
- The students who could not attend an individual assessment test for justified reasons (such as a health problem, death of a family member, accident, have the status of elite athlete and have a competition or sports activity with compulsory attendance, etc.) and provide the official documentation corresponding to the professor and the coordination of the degree (official medical certificate stating the incapacity to take an exam, police certificate, justification of the competent sports body, etc.), will have the right to take the test in a later date. The coordination of the degree will ensure for the concretion of this test, after consulting with the professor of the course.
- Students who have passed the theory part and have a grade of 4.0 or higher in both the practical and seminar parts may take the recovery exam to improve their grade. To be eligible, they must formally



renounce (via email) the previous grade, notifying the responsible professor of the course at least three days before the re-assessment exam. The theory grade that will be considered is the one obtained in the most recent exam taken by the student.

## 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. 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.

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 y de 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.

## Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PCAM) Field practices	241	Catalan/Spanish	first semester	morning-mixed
(PCAM) Field practices	242	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	241	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	242	Catalan/Spanish	first semester	afternoon
(SEM) Seminars	241	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	24	Catalan/Spanish	first semester	morning-mixed