Universitat Autònoma de Barcelona

2020/2021

Biology and Diversity in Arthropods

Code: 100849
ECTS Credits: 6

Degree	Type	Year	Semester
2500251 Environmental Biology	OT	4	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

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: Yes

Other comments on languages

Catalan will also be a common language of daily use and part of the materials and resources used will be in English.

Teachers

Guillermo Peguero Gutierrez

Prerequisites

Before enrolling to Biology and Diversity of Arthropods is convenient to have passed Mathematics, Biostatistics, Environmental Prospection, Ecology, Zoology and Zoology Extension. Besides, it is highly recommended to catch up with the contents of Zoology and the identifying features of the main groups of arthropods studied in Zoology Extension.

Objectives and Contextualisation

The goal of this subject is to provide the background, tools and skills to:

(1) understand the evolutionary success and the ecological importance of the most diversified group of multicellular organisms from an anatomic, functional, systematic and phylogenetic perspective;

(2) analyze its diversity in real communities and obtain a basic set of notions for its study and conservation.

Competences

- Adopt an ethical stance.
- Develop a sensibility towards environmental issues.
- 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.
- Obtain, observe, handle, cultivate and conserve specimens.
- Recognise and analyse phylogenetic relations.

Learning Outcomes

1. Adopt an ethical stance.
2. Collect, determine and conserve specimens and collections of invertebrates and vertebrates.
3. Develop a sensibility towards environmental issues.
4. Interpret and recognise the different states of development of invertebrates and vertebrates.
5. Interpret the distribution and the interactions in the environment of invertebrates and vertebrates and their impact on biological diversity.
6. Interpret the evolutionary processes that have led to the diversity of invertebrates and vertebrates.
7. Interpret the origin and functioning of organic structures in the different groups of invertebrates and vertebrates.
8. Recognise the characteristics that distinguish the principal groups of invertebrates and vertebrates.

Content

Program of Theory
I. Introduction.
General review of the main arthropod features.
Phylogenetic placement of the phylum and relationships between main clades.
Diversity within arhtropoda and its main diversification processes.
II. Chelicerata: Picnogonida and Euchelicerata.
Morphological characteristics, phylogenetic relationship, ecological traits (trophic ecology, reproduction, behavior and geographic distribution). Economic importance and applied issues.
III. Mandibulata I: Myriapoda
Morphological characteristics, phylogenetic relationship, ecological traits (trophic ecology, reproduction, behavior and geographic distribution). Economic importance and applied issues.
IV. Mandibulata II: Clade Pancrustacea, subphylum Crustacea.
Morphological characteristics, phylogenetic relationship, ecological traits (trophic ecology, reproduction, behavior and geographic distribution). Economic importance and applied issues.
V. Mandibulata III: Clade Pancrustacea, subphylum hexapoda.
Morphological characteristics, phylogenetic relationship, ecological traits (trophic ecology, reproduction, behavior and geographic distribution). Economic importance and applied issues.

Program of Seminars

- Eco-phylogenetics: phylogenies, functional traits and arthropod communities.
- Molecular taxonomy: basis and applications of barcoding and metabarcoding.
- Entomological research: current research topics such as climate change, conservation, biogeography addressed in 1-hour seminar class

Program of Practices

- Field practices: Learning sampling design and techniques for the study of arthropod diversity in real communities.
- Lab practices: Detailed morphological study of the main arthropod groups. Manipulation and classification of real bulk communities of arthropods.
- Bioinformatic practices: A series of hands-on classes duringwhich we will apply the background knowledge acquired in class and in the field to analyze real data and writing an integrative report.

Methodology

The main task of the professorship in this subject is to motivate the students to take an active role in their own learning. The professorship will provide the contents and will point out to the sources of additional information. Additionally, the students will be guided and supervised during the whole learning process.

To get this goals we will do the following teaching activities:

Theoretical lectures
These sessions will be developed in a regular class-space and will be based on the usual exposition of contents by the professorship. To help following the speech didactic materials will be available in advance. With these classes students will acquire the basic knowledge of this subject that must be complemented with the personal study of the materials and additional resources provided.

Seminars
The seminars will address technical and applied transversal topics as well as study cases of current entomological research which will be complementary of the theoretical classes and practices. The goal is to promote the analytical and synthesis capacity of the students and their ability to solve basic and applied research questions by means of specific skills that will be presented during the seminars and will be exercised during the field, lab and bioinformatics practices.

Lab practices
In the lab we will perform a detailed morphological study of the main lineages of arthropods placing a special emphasis in those diagnostic structures the identify the main groups, thereby deepen the taxonomic and systematic knowledge of the whole phylum. A part of the lab practices will be linked to the field practices and the students will learn basic manipulation, classification and conservation techniques of arthropod samples. During lab practices students will develop empirical skills like observation, analysis and recognition of arthropod diversity.

Field practices
In the field we will design a sampling in order to solve a specific research question and we will put into action standard sampling techniques for the study of arthropod communities.

Bioinformatic practices
At the informatics class we will perform a series of practical exercises that will allow the students the integration of the background knowledge acquired during the regular classes and seminars with the data gathered during the field and lab practices. The goal is that the students get the tools and learn the basic skills for data analysis so that they will be able to draw linkages between the diverse knowledge provided during the different teaching activities.

Tutorship
The aim of these sessions is solving doubts, review basic concepts and guide students about additional complementary sources of information. Likewise, these tutorships will also serve for supervising the integrative work to be done by the end of the subject. The schedule will be defined opportunistically by mail or through the virtual campus.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Bioinformatic practices	3	0.12	1, 6, 7, 5, 2, 3
Fieldwork practices	8	0.32	1, 4, 5, 2, 8, 3
Laboratory practical classes	17	0.68	1, 4, 2, 8, 3
Lectures	22	0.88	6, 4, 7, 5, 8, 3

Seminars	4	0.16	1, 4, 7, 5, 8, 3
Type: Supervised			
Tutorials	4	0.16	1, 6, 4, 7, 8, 3
Type: Autonomous			
Study and solve problems	50	2	6, 4, 7, 5, 8, 3
Written reports, answer to questions	33	1.32	1, 6, 4, 7, 5, 8, 3

Assessment

This subject has a continuous grading process that includes 4 main grading activities of different typologies, distributed during the whole course and none of them representing more than 50% of the final student's score.

A. Theoretical classes
Two partial exams: Regular class contents will be assessed by means of two partial exams comprising about half of the theory program.
Final exam: Those students not reaching the minimum score (that is a 5 out of 10) in one or both of the partial exams will be able to have a second chance in a final exam of the same nature. Likewise, those students aiming to improve their scores in one or the two theory parts will be allowed to attend to the final exam and be examined of the corresponding part. However, in doing so the student will automatically lose their previous partial scores.
Each of the two theory parts will represent a 25% of the final global score. To be able to pass the whole subject and get an average with the grades obtained in the other grading activities the minimum score for each theory part must be at least a 5 out of 10.

B. Practices
The assistance to all lab, field and bioinformatic sessions is mandatory.
The practices will be graded through the observation of the attitude and participation of the students, the proper execution of the exercises and the reaching of the goals determined during the development of the sessions. Additionally, lab practices will be assessed by mean of a series of morphological studies that will be delivered at the end of each session. This work will have a weigh of a 20% over the global score with a minimum score of 5 out of 10 to be able to pass the subject. To allow the students to improve their grades of this part, an additional quiz test will be done in a regular class once lab practices are finished.

C. Integrative report
Finally, the seminars, the field practices and bioinformatics sessions willbe jointly graded by means of an integrative report which will include theoretical questions as well as exercises where the students will have to show the understanding of the sampling design and the skills needed to analyze and interpret the data gathered. This work will be done by pairs of students that will be constituted the very first day of lab practices and they will be kept throughout the course duration. This integrative report will have a 30% weigh of the global grade and to pass the subject the score obtained must be at least 5 out of 10.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of practices	20%	2.25	0.09	1, 4, 5, 2, 8, 3
Evaluation of the integrative report	30%	2.25	0.09	1, 6, 4, 7, 5, 8, 3
Partial exam I (final exam I)	25%	2.25	0.09	6, 4, 7, 5, 8
Partial exam II (final exam II)	25%	2.25	0.09	6, 4, 7, 5, 8, 3

Bibliography

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Gullan P.J and Cranston P.S. 2010. The Insects: an outline of entomology. Blackwell. 4th ed.
Hickman C.P. et al. 2009. Principios Integrales de Zoología. McGraw-Hill. 14ª ed.
Krantz G.W and Walter D.E. 2009. A manual of Acarology. Texas Tech University Press. 3rd ed.

Electronic resources
• Comisión Internacional de Nomenclatura Zoológica: http://www.iczn.org/
• Ibero Diversidad Entomológica Accesible: http://sea-entomologia.org/IDE@/
• Museu Nacional de Ciències Naturals de Madrid (CSIC): http://www.mncn.csic.es/
• Natural History Museum, Londres: http://www.nhm.ac.uk/
• The Ant Wiki: https://www.antwiki.org/wiki/Welcome_to_AntWiki
• The Bug Guide: https://bugguide.net/node/view/15740
• Wikiversidad zoo artrópodos: https://es.wikiversity.org/wiki/Zoolog%C3%ADa_de_los_artr%C3%B3podos