COURSE DATA

Data Subject	
Code	33049
Name	Zoology
Cycle	Grade
ECTS Credits	10.0
Academic year	2017 - 2018

Study (s)

Degree	Center	Acad. year	Period
1100 - Degree in Biology	Faculty of Biological Sciences	2	Annual

Subject-matter

Degree	Subject-matter	Character
1100 - Degree in Biology	9 - Animal biology	Obligatory

Coordination

Name	Department
BALBUENA DIAZ-PINES, JUAN ANTONIO	355 - Zoology

SUMMARY

The subject “Zoology” is included within the area “Animal Biology”, which is compulsory in the Biology Degree. “Animal Biology” comprises 20 ECTS credits distributed in two consecutive academic years (second and third), allocated to two subjects running annually: “Zoology” (Animal Biology I: 2nd course) and “Animal Physiology” (Animal Biology II: 3rd course). The subject “Zoology” includes 10 ECTS credits and is structured around two blocks that, altogether, constitute an initiation to the discipline of zoology.

The first block includes the most general aspects. In order to approach the present hypotheses on the origin of the metazoans the study of diverse groups of allied protistans is indispensable. It also becomes necessary to deepen and expand aspects on animal development and architecture, and life cycles, that were preliminary covered by the subject “Biology” (1st course). This will allow settling the bases of animal classification, aspect with which will finalize this block of contents.

The second block is devoted to animal biodiversity, where the study of the most representative phyla of each body plan (“Bauplan”) is dealt with. In this sense, not all the animal phyla will be covered, but only

those that are more remarkable by their diversity, public health, ecological or phylogenetical importance.

The proposed set of contents and activities will provide to the students with basic knowledge to approach the subject “Animal Physiology” in the third course and, within the intensification programme of “Complements in Biodiversity and Conservation” will complement other subjets that cover diverse aspects of animal biology like “Animal Behaviour”, “Marine Biology” and “Conservation Biology”. In addition, “Zoology” is essential to follow the itineraries: “Animal Biodiversity and Conservation” and “Ecosystem Biodiversity and Conservation” within the master’s degrees “Biodiversity: Conservation and Evolution” at the University of Valencia and the subject "Applied Zoology" of interuniversity master on "Aquaculture".

In addition, given that the subjects “Zoology” and “Botany” run in parallel, this allows the co-ordination of activities, such as field courses, which helps optimize resources and students can better understand both subjects, devoted to the description of the biodiversity.

The interdisciplinary projects proposed within the subject will be developed as a cross-sectional activity jointly carried out with all the subjects of the second course.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

1100 - Degree in Biology

- Manejar correctamente la terminología científica y familiarizarse con las metodologías y fuentes de información de Biología Animal.
- Conocer el manejo de la instrumentación científica básica propia de la Biología Animal.
- Adquirir los conocimientos básicos imprescindibles que rigen la sistemática Zoológica y la filogenia.
- Aprendizaje e interpretación de los planes básicos de organización animal.
- Reconocimiento de los principales filos animales en base a su organización morfo-anatómica, hábitat y requerimientos ecológicos.
- Identificación e interpretación de estructuras y formas.
- Conocer y valorar las relaciones de los animales con su entorno biótico y abiótico.

- Adquirir conciencia del valor de la ética profesional.

LEARNING OUTCOMES

A variety of activities to acquire the main skills in this matter have been designed.

Cross-sectional skills:

Instrumental

1. - To acquire capacity of analysis and synthesis to being able to organize varied information or data by means of the proposed activities. **Activities: interdisciplinary projects, fieldwork logs.**

2. - To develop organization and planning capacity (guides, cronogram and agenda, are available from the first day of course).

3. - Capacity for oral expression, before a public audience, by means of presentations of a brief project or the involvement in debates of controversial subjects. **Actividades: seminarios interdisciplinares, colloquia, etc.**

4. - Capacity to develop a written text. **Activities: interdisciplinary projects, fieldwork logs, exams, etc.**

5. - To develop knowledge of scientific English by means of the search, selection and management of bibliography in this language. **Activities: complementary scientific article reading in theory classes; search and management of the information in interdisciplinary project.**

6. - To acquire knowledge of computer applications in an academic scope by means of self-learning in the computer classroom. **Activities: use of software for performance and interpretation of virtual dissections, development and classification excersises, as well as the implementation of the final presentation of interdisciplinary project in Power Point.**

Systemics

1. - To develop, by means of the different course activities, the independent and life learning. **Activities: bioinformatics, elaboration of seminaries and works, study of contents, search of information, etc.**

2. - To adapt to new situations. **Activities: field excursions.**

3. - To promote communication and discussion of contents to stimulate individual creative capacity.

Personal

1. - To promote teamwork abilities, developing and later presenting the interdisciplinary project. **Interdisciplinary projects, Field excursions**.

2. - To develop the ability to debate based on rational criteria, differentiating clearly what is debatable

from fact and scientific evidence (critical reasoning). **Activities: colloquia, lectures, seminars.**

3. - To acquire social and professional conscience of on environmental problems and the importance of the biodiversity and its conservation (ethical commitment). **Activity: Field excursions.**

4. - To promote interpersional skills and capacity to interact with both teachers and peers. **Activities: Field excursions, teamwork, practicals, colloquia, seminars, tutoring, etc.**

Specific instrumental skills:

These skills provide the student a vision of the different aspects about animal biology. The students in this subjet will acquire the following abilities:

- To analyze the basic designs of animal organization (Bauplan) and the principles of classification animal as introduction to zoological diversity. To acquire practical abilities in handling techniques and specific terminology.

- To be aware and to value animal diversity (form: morphology and anatomy) and to identify the functional adaptations (function) allowing animals to occupy given ecological niches, as well as to study the interactions among them and with the environment (animal ecology).

- To identify the main animal taxa and to develop the techniques of capture, observation, preparation and conservation relative to the different groups.

- To analyze life history, biological development, life cycles and reproduction types in different animal phyla.

- Discutir y analizar posibles relaciones filogenéticas entre grupos animales a partir de evidencias morfoanatómicas, embriológicas, genéticas, bioquímicas, ecológicas, etc. (filogenia animal).

- To discuss and to analyze possible phylogentic relationships between animal groups based on morphoanatomic, embryological, genetic, biochemical, ecological and other evidence. (Animal phylogeny).

- To develop applied aspects in the use and animal handling in biological control of plagues, environmental impact studies (bioindicators) and in diverse industrial applications, among others.

DESCRIPTION OF CONTENTS

1. Basic aspects of the animal kingdom

TOPIC 1. - Zoology: concept and limits. Hypotheses on the origin of the animals. Animal-like Protista: the Protozoa.

TOPIC 2. - Development. Life cycles. Architecture. Animal phylogeny and classification.

2. Animal diversity.

In this block animal taxa will be studied, as specified below, following the same format, including the most important aspects about form and function, classification, ecology and phylogeny.

TOPIC 3. - Phylum Porifera. Body organization.

TOPIC 4. Phylum Cnidaria. Metagenesis and coral reefs.

TOPIC 5. Lophotrochozoa. Phylum Plathyhelminthes. Life cycles. Parasitism. Economic and sanitary importance.

TOPIC 6. Phylum Mollusca. Adaptive radiation. Economic and ecological importance.

TOPIC 7. Phylum Annellida. Metamerism and hydrostatic skeleton.

TOPIC 8. Ecdysozoa. Phylum Nematoda. Life cycles. Sanitary, economic and ecological importance.

TOPIC 9. Phylum Arthropoda. Arthropodization: tagmae and appendices. Body organization. Origin and diversification.

TOPIC 10. Main Athropoda groups. Ecological and economic importance.

TOPIC 11. - Deuterostomes. Phylum Echinodermata. Symmetry and ambulacral system.

TOPIC 12. - Phylum Hemichordata and phylum Chordata. Origin and evolution.

TOPIC 13. Pisciform vertebrates. Agnatha and Gnathostomata.

TOPIC 14. - Tetrapoda. First terrestrial vertebrates. Amphibians.

TOPIC 15. - Amnyotes and the cleidoic egg. Reptiles. Birds. Mammals.

3. Practicals

PRACTICAL 1. - Porifera. Spicular skeleton and diversity.

PRACTICAL 2. - Cnidaria. Anatomy and diversity.

PRACTICAL 3. - Flatworms. Anatomy and diversity.

PRACTICAL 4. - Mollusks I. Functional interpretation of gastropods and bivalves.

PRACTICAL 5. - Mollusks II. Mollusk dissection.

PRACTICAL 6. - Annelids. Anatomy, locomotion and diversity.

PRACTICAL 7. - Nematodes. Dissection of Ascaris sp. or extraction of Anisakis sp. from fish.

PRACTICAL 8. - Arthropods I: morpho-anatomy of chelicerates and crustaceans.

PRACTICAL 9. - Arthropods II: morpho-anatomy of insects and miriapods.

PRACTICAL 10. - Arthropods III: identification of insects orders.

PRACTICAL 11. - Fish-shaped vertebrates. Morphological interpretation.

PRACTICAL 12. Amphibian and reptile diversity.

PRACTICAL 13. Preliminary training for bird identification in the field.

PRACTICAL 14. - Mammals. Functional interpretation of skulls.

Note: The order of the practical sessions can be altered due to organizational reasons

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	56,00	100
Laboratory practices	40,00	100
Tutorials	4,00	100
Development of group work	10,00	0
Study and independent work	140,00	0
TOTAL	**250,00**	

TEACHING METHODOLOGY

• **Participative lectures:** Teachers will expose the fundamental concepts of each subject. The students will be oriented about the appropriate bibliography and resources for each session. The time needed to cover each of the 15 topics will vary. Some topics will be complemented with videos and animations.

• **Laboratory practicals:** 14 practicals of 2-hr duration and coordinated with theoretical contents have been devised. Before each practice, the students will be handed and outline that will have to be read beforehand. During the session the instructor will introduce the objective of the practical and will brief the basic concepts that will be dealt with. During the rest of the session, the students will carry out the practical under the instructor's supervision.

• **Field excursion, zoology:** An itinerary will be carried out in a suburban or rural (to be decided based on the organizational capacities) environment.

• **Interdisciplinary field excursions**: Two itineraries of didactic value will be carried out.

+ Excursion the Font Roja Natural Park (Alicante).

+ Excursion for observation and identification of birds and botanical transect in the Albufera Natural Park (Valencia).

In all the excursions (zoology and interdisciplinary) the students will exercise their capacities of observation, of direct and indirect identification of the fauna, of integration of the collected data and extraction of general ecological patterns. The students will work in teams of two to four individuals. Each student will take a registry of the observations made in a field log. The teams should be necessarily formed by students of the same practical subgroup.

Tutorials in reduced group (16 students): Tutorials will be compulsory and they will be carried out in two sessions of 2hr each in the dates indicated in the subject's calendar. One tutorial each will be held during the first and second semester. The tutorials will be devoted to solving questions posed by instructors. These will be aimed at extending, deepening or clarifying aspects covered by the lectures or at debating current topics related to the subject.

Attendance to the laboratory practical, field trips and group tutorials is compulsory. Unjustified absence to 20% of the hours devoted to these activities will result in a zero mark in the corresponding activity.

Individual tutorials: They will be used to solve specific questions or personal problems of the student with the subject. They could be run on site or through electronic mail.

Interdisciplinar project: execution and deliverance of a presentation. This is a cross-sectional activity common to all the subjets of the second course of the degree in Biology (Cell and Tissue Biology, Developmental Biology, Biochemistry, Botany, Genetics, Molecular Methods in Biology, Evolutionary Processes and Mechanisms, and Zoology). The activity is compulsory for all the students who are registered in the second course, except for those that carreid it out previously (and the mark has been awarded). Each work group, formed by three students, will carry out a project (that will consist of a

written work and an oral presentation) about a subject assigned by drawing between the proposed ones by the teachers of the participant subjets in this activity. Each nterdisicplinary work will be considered tied (to its repercussion in evaluation of the activity below) to the subjet on which the assigned subject depends directly. To each works a tutor will assigned, who will oversee its execution and will supervise its presentation. A series of periodic meetings with the tutor throughout the academic year will be scheduled. In the beginning of the academic year, a calendar establishing the dates of these meethings, as well as the dealines will be made publicly available. In addition a co-tutor will be assigned, who will review the final version of the presented work. Each project will be presented orally by all the members of the group during 30 minutes. Presentations will be attended by all the students of the course, since the attendance is obligatory, and two teachers: the tutor and a companion instructor (other that the cotutor, chosen between the course teachers). Both students and instructors will participate in the selection of the projects that because of their quality and originality will be presented in the Congress of Biology, organized jointly by the first and second course of the degree in Biology.

Voluntary activities: The students will be able to carry out other complementary activities that complete their formation and active participation in the class, voluntarily and always **previous consultation to the instructor** during the first semester.

EVALUATION

There will be a continuous assessment of each student, based on onsite and distance activities. It will evaluate the participation in the activities onsite, the presentation and execution of projects and voluntary activities and participation and involvement in the learning-teaching process. Aspects to be assessed are:

• **Written tests on the contents of the course.** There will be a midterm and a final examination of the theoretical contents, which will account for 50% of the grade. At the end of course an examination of practical contents will be held, contributing to 30% of the overall grade. It will be a prerequisite for passing the subject to reach at least a score of 5 out of 10 in each of the tests.

- ***Assessment of the theoretical contents:***

At the end of the first term a midterm examination will be held, and it is necessary a minimum mark of five to pass.

If failed or not carried out, the contents covered by the midterm will be included in the June final exam, being a minimum mark of five required to pass.

Passed first and second term exams will be kept until the July call.

- ***Assessment of the group seminars:***

Both the midterm and final examinations can include questions related to the contents dealt with during the group seminars. In addition, the student's contribution in each session will be evaluated. The mark obtained in the activity will modulate the final theory mark with a maximum value of +0.5 points

The mark obtained in group seminars passed in 2015-2016 could be used in the present academic year.

- ***Assessment of the laboratory practicals:***

At the end of the first semester will be a midterm exam, requiring a minimum grade five to remove material.

Failure to approve or carry out the first set, this will recover in the final practice exam, requiring the same minimum grade above pass grade.

Practical contents approved in the first or second semester will be saved until the July.

The voluntary resolution of the questions in the practical booklets will modulate the final practical mark with a maximum of +1.0 points.

The final mark of practicasl may be modulated up to 0,5 points in function of the student's participation and attitude in the laboratory sessions

Attendance at practical sessions is mandatory. Unjustified absence from 20% of the practical sessions will result in a mark of zero as final practical score.

- **Field trip report.**

After the completion of each excursion (zoology and interdisciplinary) a questionnaire will be handed to the students. Students must fill them and hand in a global field-trip report with the answers based on the annotations and other records (for example, photographs, or sound recordings) entered in the student's field log. For assesment purposes, personal interviews may be arranged to discuss or clarify any aspect of the assigment submited. The field report will contribute 10 % to the overall mark. ***Handing of the field report is a requirement to pass the course.***

Passed marks of practicals (test and field questionnaires) will be considered until the July call. Passed marks of test and field questionnaires in 2015-16 will be considered until the July call of the present academic year.

NO MARKS OF THEORY AND PRACTICALS WILL BE CONSIDERED FOR THE FOLLOWING COURSE.

- **Assessment of the interdisciplinary project:**

- The mark obtained in the interdisciplinary project will represent 10% of the grade of the course. Grading is carried out by the project's tutor and co-tutor. The assessment of this activity includes both the scientific content covered and way it is presented, especially valuing the ability to communicate and transmit ideas and concepts. The projects selected for presentation at the Congress of Biology have an additional mark, equivalent to 10% of the overall project grade.
- In the case of failing the subject, the rating of the interdisciplinary work will be taken into account for the next course.
- In case the (mandatory) interdisciplinary project is not carried out, it will lead to failing the linked subject (i.e., the one proposing the topic and associate to the tutor), regardless of the grade obtained in the rest of the subject.
- Alternatively to this activity, any other transversal activity backed by the CAT as part of an innovative education can be carried out.
- In case of failing the course because of not carrying out the interdisciplinary activities or the alternative activity related to this subject the grade earned in the rest of the course in the case considered approved (i.e. obtaining a grade equal to or greater than 5 on a maximum of 9, in addition to meeting the other criteria needed to pass this course, as detailed in this Teaching Guide) will be saved. This rating is saved only until the next course, and will add to the grade obtained when the interdisciplinary activity is performed.
- In the event that the present subject is not the subject linked to the interdisciplinary work, if no interdisciplinary work is performed, in order to pass the subject it will be necessary to obtain a grade equal to or greater than 5 on a maximum of 9, not having scored in the interdisciplinary activity (in addition to complying with the rest of criteria needed for pass this subject, and which are detailed in this teaching guide).

- **The score on voluntary and complementary activities** that the student has made during the course, contribute to modulate the final grade for the course, with a maximum value of +1.0 points. Marks obtained during 2015-16 could be considered in the present academic year.

REFERENCES

Basic

- HICKMAN, C.P.; ROBERTS, L.S.; KEEN, S.L.; LARSON, A.; LANSON, H.; EISENHOUR, D.J. (2009). Principios Integrales de Zoología. Ed. McGraw-Hill/Interamericana de España, S.AU. 14/E. Madrid.

- MICHELENA, J.M.; J. LLUCH; J. BAIXERAS (2004). Fonaments de Zoologia. Universitat de València. Servicio de Publicaciones. Valencia.
- DIAZ, J.A. & T. SANTOS (1998). Zoología. Aproximación Evolutiva a la Diversidad y Organización de los Animales. Ed. Síntesis, S.A. Madrid.
- DORIT, R.L.; WALKER, W.F. & BARNES, R.D. (1991). Zoology. Ed. Sauders College Publishing. Philadelphia.

Additional

- ALEXANDER, R. McN. (1990). Animals. Cambridge University Press. Cambridge. Reino Unido.
- BRUSCA, R.C. & G.J. BRUSCA (2005). Invertebrados. 2ª edición. Ed. McGraw Hill / Interamericana de España, S.A. Madrid. (Traducción de la versión en inglés de 2003).
- KARDONG, K.V. (2007). Vertebrados: Anatomía Comparada, Función, Evolución (4 ed.). Ed. McGraw Hill / Interamericana de España, S.A. Madrid.
- RUPPERT, E.E. & BARNES, R.D. (1996). Zoología de los Invertebrados. Ed. McGraw Hill / Interamericana de España, S.A. Madrid.
- SELFA, J. & PUJADE-VILLAR, J. (2002). Fonaments de Zoologia dels Artròpodes. Universitat de València. Servicio de Publicaciones. Valencia.
- BARRIENTOS, J.A. (Coord.) (1988). Bases para un Curso Práctico de entomología. Asociación española de Entomología. Barcelona.
- BELLMANN, H. (1994). Arácnidos, Crustáceos y Miriápodos. Ed. Blume. Barcelona.
- CHINERY, M. (1984). Guía de Campo de los Insectos de España y Europa. Ed. Omega. Barcelona.
- HAISTON, N.G. (1994). Vertebrate Zoology. An Experimental Field Approach. Cambridge University Press. Cambridge. Reino Unido.
- LAVERACK, M.S. & DANDO, S. (1987). Lecture Notes on Invertebrate Zoology. Blackwell Scientific Publications. Oxford. Reino Unido.
- LINDNER, G. (1977). Moluscos y Caracoles de los Mares del Mundo. Ed. Omega. Barcelona.
- MCMAHON, T.A. & BONNER, J. T. (1986). Tamaño y Vida. Ed. Labor. Barcelona
- NEEDHAM, J.G. & NEEDHAM, P.R. (1978). Guía para el Estudio de los Seres Vivos de las Aguas Dulces. Ed. Reverté. Barcelona.
- PETERSON, R.; MOUNTFORT, G.; HOLLOM, P.A.D. (1991). Guía de Campo de las Aves de España y de Europa. Ed. Omega. Barcelona.