VNIVERSITAT DE VALÈNCIA

Course Guide
43248 Paleodiversity and vertebrate evolution

COURSE DATA

Data Subject	
Code	43248
Name	Paleodiversity and vertebrate evolution
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
2148 - M.D. in Biodiversity: Conservation and Evolution	Faculty of Biological Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
2148 - M.D. in Biodiversity: Conservation and Evolution	5 - Cross-disciplinary optional subject areas 1	Optional

Coordination

Name	Department
ABELLA PEREZ, JUAN	356 - Botany and Geology

SUMMARY

This subject, of a theoretical-practical nature, is taught in the second semester of the master's degree. It provides an overview of the fossil record of the main groups of vertebrates, including hominids. It provides information on the conservation processes that have given rise to their rich and diverse record, and introduces students to the morphological evolution of vertebrates, as well as the main facts of their palaeobiogeographical history. Finally, information will be provided on the main vertebrate palaeontological sites in the fossil record of the Iberian Peninsula and, especially, of the Valencian Community. The practical part includes visits to museums (such as the Museo Paleontologico de Alpuente) and, if possible, a visit to a vertebrate palaeontological site. It also deals with the observation and functional significance of the main morphological characters of bones and teeth, as well as the interpretation of taphonomic information. Furthermore, the techniques of excavation, preparation and conservation of vertebrate fossils are covered, including the treatment of sediment samples to obtain microvertebrates. In this way, the student will gain knowledge of the main techniques for the recovery of fossil vertebrates. Likewise, importance is given to attending lectures and seminars related to the subject.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

There are no enrolment restrictions with other subjects in the syllabus. However, it is advisable to have a minimum knowledge of Zoology, Ecology, as well as general Geology and Palaeontology.

OUTCOMES

2148 - M.D. in Biodiversity: Conservation and Evolution

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- To acquire basic skills to develop laboratory work in biomedical research.
- Be able to make quick and effective decisions in professional or research practice.
- Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Be able to access to information tools in other areas of knowledge and use them properly.
- To be able to assess the need to complete the scientific, historical, language, informatics, literature, ethics, social and human background in general, attending conferences, courses or doing complementary activities, self-assessing the contribution of these activities towards a comprehensive development.
- Favour intellectual curiosity and encourage responsibility for one's own learning.
- Encourage ethical commitment and environmental awareness.
- Be able to communicate and disseminate scientific ideas.

LEARNING OUTCOMES

- To understand the defining features of vertebrates and how these features influence their own preservation in the fossil record.

- To know the main groups of fossil vertebrates.

- To know the main facts of the evolutionary and biogeographical history of vertebrates.

- To know the application of vertebrates in biostratigraphy.

- To understand the role played by vertebrates in past ecosystems.

- Understand the place of hominids, and the human species in particular, in the history of life.

- To know the main sites of fossil vertebrates in the Iberian Peninsula and, especially, in the Valencian Community.

- To understand the importance of conserving this palaeontological heritage.

- To know the main palaeontological techniques of excavation, recovery, preparation and conservation of fossil vertebrates.

DESCRIPTION OF CONTENTS

1. Theoretical Block

Unit 1. Introduction to vertebrates. Biomorphodynamics and comparative anatomy of the skeleton. History of knowledge about fossil vertebrates.
Unit 2. Taphonomy of vertebrates. Types of sites. Exceptional conservation. Fossil vertebrates of the Iberian Peninsula. Main deposits of the Valencian Community.
Unit 3. Origin of chordates. The first vertebrates: agnates. Ostracoderms.
Unit 4. Fishes: placoderms, acanthodians, chondrichthyans, osteichthyans (sarcopterygians and actinopterygians).
Unit 5. Adaptations to the terrestrial environment. Origin and diversification of the tetrapod model. Amphibians and origin of amniotes.
Unit 6. Reptiles. Synapsids (pelycosaurids and therapsids). Anapsids (chelonians). Diapsids. Marine and flying reptiles of the Mesozoic.
Unit 7. Dinosaurs. Saurischians (theropods -including birds- and sauropodomorphs). Ornithischians. The great extinction of the Cretaceous-Tertiary boundary.
Unit 8. Mammals. Origin and Mesozoic mammals. The radiations of the Cenozoic.
Unit 9. Primates. Origin. Non-hominoid primates.
Unit 10. Hominoids and hominids of the Miocene. Homininae. Anatomical consequences of bipedalism.

2. Practical Block

Practical 1. Anatomy of vertebrate bones and teeth.
Practical 2. Vertebrate taphonomy.
Practical 3. Techniques for the recovery and preparation of fossil vertebrates.
Practical 4. Field work.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	20,00	100
Laboratory practices	10,00	100
Attendance at events and external activities	2,00	0
Development of group work	5,00	0
Development of individual work	4,00	0
Study and independent work	8,00	0
Readings supplementary material	4,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	6,00	0
Preparation of practical classes and problem	4,00	0
Resolution of case studies	2,00	0
TOTAL	75,00	

TEACHING METHODOLOGY

- Lectures, given by the lecturer, to provide the basic knowledge and methodology to be used.

- Practical laboratory classes, focused on the application of some of the concepts introduced in the theoretical classes.

- A field practical, consisting of a visit to museums or palaeontological site, with a preliminary introduction by the teacher and, subsequently, a work or seminar by the students on the results of the visit.

- The set of knowledge covered in the theoretical and practical classes will be assessed by means of the development and public defense of a poster.

- Individual or group use of materials prepared or referenced by the teacher for the elaboration of work by the students. Students must carry out a theoretical work on a topic from a list of topics suggested by the teacher. It will be based mainly on bibliographical data without excluding the possibility of incorporating experimental data. The work carried out by the students will be dealt with in class in the form of seminars.

- Face-to-face tutorials, individual or in groups, with the lecturer to supervise the work carried out by the students.

- Participation in seminars developed by the students themselves, attendance at external seminars, conferences, visits to museums and other activities.

- Use of the virtual classroom as a communication tool.

EVALUATION

- Test (oral presentation) that are carried out, individually or in groups, throughout the semester for the evaluation of the technical competences of the subject, and whose contribution to the final grade may not exceed 70% of the total.

- Attendance and use of the classes

- Report on the practicals and field trips activities.

Assessment activities Weighting

Final exam 70%.

Practicals/laboratory/field work reports 20%

Continuous assessment 10%.

REFERENCES

Basic

- Benton, M.J. 1995. Paleontología y Evolución de los Vertebrados. Editorial Perfils, Lleida, 369 p.
- Carroll, R.L., 1988. Vertebrate Paleontology and evolution. W.H. Freeman and Company, New York.
- Janvier, P. 1996. Early Vertebrates. Oxford Monographs on Geology and Geophysics, 33. Oxford: Clarendon Press, 393 p.
- Long, J.A. 1995. The Rise of Fishes: 500 Million Years of Evolution. Johns Hopkins University Press, Baltimore, 223 pp.

- Lyman, R.L. 1994. Vertebrate Taphonomy. Cambridge University Press, 524 p.
- Szalay, F.S. & Delson, E. 1979. Evolutionary history of the primates. Academic Press, Inc., San Diego, 580 p.
- Weishampel, D.B., Dodson, P. & Osmólska, H. (eds.) (2nd ed.) 2004. The Dinosauria. University of California Press, Berkeley, 862 p.

Additional

- Agustí, J. & Antón, M. 2002. Mammoths, Sabertooths, and Hominids. 65 million years of mammalian evolution in Europe. Columbia University Press, New York, 313 p.
- Belinchón, M., Peñalver, E., Montoya, P. & Gascó, F. 2009. Crónicas de Fósiles. Las colecciones paleontológicas del Museo de Ciencias Naturales de Valencia. Ayuntamiento de Valencia, 544 p.
- Lockley, M.G. 1993. Siguiendo las huellas de los dinosaurios. McGraw-Hill/Interamericana de España, Madrid, 307 p.