VNIVERSITAT DE VALÈNCIA

Course Guide
46738 Palaeoecology, palaeoclimatology and palaeobiogeography

COURSE DATA

DATA SUBJECT

Code: 46738
Name: Palaeoecology, palaeoclimatology and palaeobiogeography
Cycle: Master's Degree
ECTS Credits: 3
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
2266 - Master's Degree in Applied Palaeontology	Facultat de Ciències Biològiques	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2266 - Master's Degree in Applied Palaeontology	Fundamentals of palaeontology	COMPULSORY

COORDINATION

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SUMMARY

The distribution of the living beings on Earth and the processes that have originated it and modified them are the scope of study of biogeography. Biogeography can be divided into two clearly separated areas: on the one hand, ecological biogeography, which deals with short-term, smaller-scale time periods; with local, within-habitat or intracontinental issues; and mainly with species or subspecies of living animals or plants, and on the other hand, historical biogeography, which analyses long-term evolutionary periods; with larger areas, sometimes global; and often with taxa above the level of the species and with taxa that may currently be extinct.

The limiting mechanisms of the distribution of present and past organisms are intimately related to ecological and climatic aspects, in addition to the geological and biological "engines" of the planet, such as plate tectonics (geology) and evolution (biology).

From an integrative perspective and with a view to the solid current basis derived from biogeography-ecology-geology, in this course we study those aspects that bring together in a single framework the biogeographic, ecological and climatic issue, from an actualist perspective, but with the aim of

understanding and understanding the changes of the past as a result of this interaction.

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 enrollment restrictions with other subjects. The subject is mandatory and is taken in the first semester of the master's program.

COMPETENCES / LEARNING OUTCOMES

2266 - Master's Degree in Applied Palaeontology

Access information tools from other areas of knowledge and use them appropriately.

Access the necessary information in the specific field of the subject (databases, scientific articles, etc.) and have sufficient judgement to interpret and use it.

Apply critical reasoning and argumentation based on rational criteria.

Apply science from a social and economic point of view, promoting the transfer of knowledge to society.

Apply the knowledge acquired and problem-solving abilities in new or unfamiliar situations within broader (or multidisciplinary) contexts related to the field of study.

Apply the research experience acquired to initiate the research phase of a PhD programme on biodiversity-related topics.

Apply the research experience acquired to tasks specific to the profession, both in the private sector and in public institutions.

Assume an ethical commitment and sensitivity towards environmental problems and natural and cultural heritage.

Be familiar with, develop and manage georeferenced databases of elements from the geological and palaeontological record, as well as the software used for the spatial representation and analysis of these elements.

Communicate and popularise scientific ideas.

Communicate conclusions and the knowledge and rationale supporting them to specialised and non-specialised audiences clearly and unambiguously.

Conduct studies, applying the methods and techniques needed to preserve and manage palaeontological heritage.

Continue the learning process in a manner that is largely self-directed or independent.

Demonstrate in-depth understanding of the historical nature of the evolutionary process, both in its aspects of unrepeatability and contingency and in those linked to the fulfilment of laws of nature of all kinds and, therefore, of necessity.

Demonstrate intellectual curiosity and encourage responsibility for one's own learning.

Demonstrate knowledge and understanding of the legal foundations for the protection and conservation of palaeontological heritage at the level of the EU, Spain and the Spanish Autonomous Communities.

Develop experimental skills in the handling of laboratory material and equipment in palaeontology.

Integrate knowledge and confront the complexity of making judgements based on information that, although incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of knowledge and judgements.

Know, understand and draw conclusions, applicable to the present time, about the crises of biological diversity, and their causes and consequences within the framework of actualism.

Know and confidently handle the divisions of the geological time scale and the biostratigraphic scales constructed from different groups of biota in the fossil record.

Know and understand past biological events, as well as the zonations, in time and space, of biota in order to establish the relative stratigraphic position of sedimentary rocks from different geographical areas.

Know and understand the palaeodiversity of living beings, their ecosystemic relationships and the palaeogeographical distribution achieved by the main groups of living beings throughout the Earth's history.

Learn about the techniques used in museums for the management of palaeontological heritage, identifying, during guided work visits, successful examples in the field of palaeontology (Dinópolis, the Catalan Institute of Palaeontology, the Palaeontological Museum of Elche).

Make quick and effective decisions in complex situations in their professional or research work, by developing new and innovative work methodologies adapted to the scientific/research, technological or professional field in which they carry out their activity.

Plan and manage available resources, taking into account the basic principles of quality, risk prevention, safety and sustainability.

Prepare, write and present reports and projects in public in a clear and coherent manner, defend them with rigour and tolerance and respond satisfactorily to any criticism that may arise from the presentation.

Produce all types of reports related to palaeontological matters clearly and concisely at an official or professional level (reports, grants, heritage impact reports, research projects, etc.)

Understand the nature of the stratigraphic record, its discontinuities, cycles and events, the different types of sedimentary basins, the factors controlling their infilling, the resulting three-dimensional geometries and stratigraphic correlations.

Use acquired knowledge as a basis for originality in the development or application of ideas, often in a

research context.

Work efficiently in a professional or research team, acquiring the ability to participate in research projects and scientific or technological collaborations.

DESCRIPTION OF CONTENTS

1. Paleoecology

Definition and basic concepts of (paleo)ecology, ecosystem interactions (abiotic and biotic), paleoenvironmental inferences, methods in paleoecology, paleoecology in a temporal and evolutionary context.

2. Paleoclimatology

Concepts, history of paleoclimatology, causes of climate change, paleoclimatic records (historical, glacial, biological...), paleoclimatology: history of climate on Earth since its origins.

3. Paleobiogeography

Historical biogeography and ecological biogeography. Distribution patterns: limiting factors. Communities and ecosystems. Biodiversity patterns. Planetary mechanisms as drivers of biogeography: the geological driver (plate tectonics) and the biological driver (evolution). Patterns of life in the present (dispersion, vicariance, and endemism) and their reflection in the past. Ice and change.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	18,00
Laboratory	12,00
Total hours	**30,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	45,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00

Total hours	**45,00**

TEACHING METHODOLOGY

Theoretical face-to-face classes will be taught to provide fundamental knowledge covering the basic aspects of the program. In addition, guided seminars may be conducted by the professor, consisting of detailed study of specific examples or discussion on certain aspects of the program.

Two laboratory practical sessions will be conducted, during which the necessary information will be provided for students to carry out their own paleoecological, paleoenvironmental, and paleobiogeographic interpretations. These practical sessions will serve to reinforce the key concepts covered in the theoretical classes.

EVALUATION

The evaluation of the theoretical and practical aspects of the subject will be done through an exam, which will eliminate material whenever the passing grade is achieved or exceeded. The exercise will consist of three sections with 3 essay questions and 3 short-answer questions, one short and one essay question for each of the thematic blocks (sections) of the course, namely: a) Paleoecology, b) Paleoclimatology, and c) Paleobiogeography.

Out of the 6 questions given, students must answer 3 under the following conditions:

1. From each block-section, at least one question, whether short or essay, must be answered.
2. Only answering short-answer questions is not allowed.

Each section (a, b, and c) must be passed separately (a minimum score of 5 out of 10 in each); failing in one section means not passing the exam, except in the case of compensation: if one section has a grade between 4.0 and 4.9, it can be compensated if the final calculation of the overall exercise grade is at least a 5. If two sections have grades between 4 and 4.9, no compensation is possible, and the exam will not be considered passed, requiring the student to retake the entire exam in the next session. This exam represents 90% of the final grade for the subject.

Laboratory-cabinet practices, as well as attendance to theoretical classes, will be continuously evaluated. The continuous assessment will take into account attendance to theoretical and practical classes, and the participatory attitude of the students. This assessment represents 10% of the final grade.

Evaluation considerations for the 1st session:

1. All sections (a, b, c) are scored on a maximum grade of 10, and they are considered passed when the minimum passing value is achieved.
2. Continuous assessment is scored out of 10, and in order to be eligible to take the exam, the score for this component must be equal to or higher than 5.
3. The subject will be considered passed when a minimum grade of 5.0 points is obtained in the first three sections.

Evaluation considerations for the 2nd session:

If the final score of the evaluated aspects is lower than the minimum required points to eliminate material, the student will have to retake the section in which they did not reach a score of 5. In any other circumstan

REFERENCES

- Cox, C.B., Moore, P.D., Ladle. R.J. (2016). Biogeography. An Ecological and Evolutionary Approach. Wiley Blackwell. 482p. -Bottjer, David J. Paleoecology: past, present and future. John Wiley & Sons, 2016. -Allmon, Warren, Warren D. Allmon, and David J. Bottjer, eds. Evolutionary paleoecology: the ecological context of macroevolutionary change. Columbia University Press, 2001. -Cronin, Thomas M. Principles of paleoclimatology. Columbia University Press, 1999. -Bradley, Raymond S. Paleoclimatology: reconstructing climates of the Quaternary. Elsevier, 1999.

- Cao, W., Zahirovic, S., Flament, N., Williams, S., Golonka, J., Dietmar Müller, R. 2017. Improving global paleogeography since the late Paleozoic using paleobiology. Biogeosciences 14, 5425 5439. https://doi.org/10.5194/bg-14-5425-2017. -Chiarenza, A.A., Mannion, P.D., Farnsworth, A., Carrano, M.T., Varela, S. Climatic constraints on the biogeographic history of Mesozoic dinosaurs. Current Biology 32, 570585.