VNIVERSITAT DE VALÈNCIA

Course Guide
44311 Palaeodiversity and evolution of plants

COURSE DATA

Data Subject	
Code	44311
Name	Palaeodiversity and evolution of plants
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2200 - M. U. en Paleontología Aplicada	Faculty of Biological Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
2200 - M. U. en Paleontología Aplicada	6 - Palaeodiversity	Optional

Coordination

Name	Department
ABELLA PEREZ, JUAN	356 - Botany and Geology

SUMMARY

The course Paleodiversity and Plant Evolution shows the historical evolution of the Plantae Kingdom, with emphasis on the main milestones such as the origin and subsequent evolution of the main groups of plants and their interrelationships. Being a multidisciplinary subject developed in the Faculty of Biology and taught by the Department of Geology, special emphasis will be placed on the biological and geological aspects of the paleobotanical approach. This combination allows us to establish when the main groups of plants originated, when each of them reached their maximum diversity and, in the case of some groups, when they became extinct.

Taphonomic aspects and the reconstruction of the complete plant from disarticulated parts are relevant. Other aspects that will be emphasized in this course are. 1) The evolution of plant groups; 2) Contributions of plants to biostratigraphy and correlation; 3) Paleoecology and the evolution of paleoenvironments through the study of paleovegetation; 4) Determination of paleoclimates from fossil plants.

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 of the curriculum. However, it is advisable to have a minimum knowledge of Zoology, Botany and Ecology, as well as general Geology and Paleontology.

OUTCOMES

2200 - M. U. en Paleontología Aplicada

- 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.
- 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.
- Be able to communicate and disseminate scientific ideas.
- Ser capaces de trabajar en equipo con eficiencia en su labor profesional o investigadora, adquiriendo la capacidad de participar en proyectos de investigación y colaboraciones científicas o tecnológicas
- Ser capaces de acceder a la información necesaria en el ámbito específico de la materia (bases de datos, artículos científicos, etc.) y tener suficiente criterio para su interpretación y empleo.
- Aplicar el razonamiento crítico y la argumentación desde criterios racionales.
- Capacidad para preparar, redactar y exponer en público informes y proyectos de forma clara y coherente, defenderlos con rigor y tolerancia y responder satisfactoriamente a las críticas que pudieren derivarse de su exposición.
- Conocer y comprender en profundidad la naturaleza de la biodiversidad y sus relaciones ecosistémicas tanto en la actualidad como en el pasado.

- Conocer la naturaleza del registro fósil en relación con el proceso sedimentario, las fases bioestratinómicas y fosildiagenéticas del proceso y los mecanismos de fosilización.
- Conocer y manejar con fluidez, las divisiones de la escala de tiempo geológico, y las escalas bioestratigráficas construidas a partir de diferentes grupos de biotas del registro fósil.
- Conocer y entender en profundidad la Geología regional de España y de zonas periféricas, y en particular de la Comunitat Valenciana, conociendo en detalle los principales hitos paleontológicos representados en los yacimientos de la Península Ibérica y el norte de África.
- Conocer y entender las causas del cambio climático y los proxies (estudio de diatomeas, foraminíferos, anillos de crecimiento de árboles, núcleos de hielo, datos del clima actual, etc.) usados para la caracterización de climas del pasado.
- Elaborar de una forma clara y concisa, todo tipo de memorias relacionadas con la temática paleontológica a nivel oficial o profesional (informes, subvenciones, memorias de impactos patrimonial, proyectos de investigación, etc.)

LEARNING OUTCOMES

Methodical observation of the paleobotanical record in the outcrops.

Preparation of a field notebook reflecting observations in the field.

Elaboration of a practice notebook reflecting the student's weekly observations on the different fossil groups of plants.

Elaboration of paleontological reports based on field work and specialized bibliographic consultation.

Correct extraction and adequate preparation of plant fossils for scientific work.

Accurate positioning of samples in the stratigraphic series based on field observations.

Accurate description of the main plant fossil groups present in the field area.

Establishment of the chronological order of appearance and extinction of the main groups of fossil plants.

Presentation of the data elaborated from field work and bibliographic research to classmates and teachers in public sessions.

Recognition of the most important climatic changes in the history of the earth through the paleobotanical record.

DESCRIPTION OF CONTENTS

1. General Aspects of Paleobotany

Definition and objectives of Paleobotany. Historical Evolution

2. Biostratigraphy and correlation

Types and methods of correlation. Types of stratigraphic units. Types of correlation. Correlation methods. Utility of fossils in Geology. Geological aspects. Taxonomic aspects. Biostratigraphic aspects. Chronostratigraphic aspects.

3. Taxonomic Aspects with Application to Paleobotany

Fossilization processes and types of fossils. Permineralization and petrification. Carbonized compression. Cementation. Unaltered plant material.

4. Precambrian primitive organisms and environmental context

The origin of Life on Earth. The earliest record of Life on Earth (Paleoarchaic). Life in the Mesoarchaic-Neoarchaic. Oxygenation of the Earth. Life in the Proterozoic. Origin of Eukaryotes. The earliest multicellular life. Stromatolites.

5. The Paleozoic Flora

General aspects of evolution of the Paleogeography and Flora in the Cambrian. Paleogeography, climate and sea level in the Ordovician. Life and Flora in the Ordovician. Paleogeography and Plant Life in the Silurian. Terrestrial colonization. Paleogeographic context and Devonian flora. The first forests. Paleogeography and general flora of the Carboniferous. Permian climate and flora. Evolution of paleoclimatic bands.

6. Mesozoic Flora

Triassic paleogeography, climate and flora. Jurassic paleogeography, climate and flora. Cretaceous paleogeography, climate and flora. The explosion of angiosperms.

7. The Cenozoic Flora

Paleogeography, climate and Paleogene flora. Paleogeography, climate and Neogene flora. Quaternary paleogeography, climate and flora.

WORKLOAD

ACTIVITY	Hours	% To be attended
Laboratory practices	16,00	100
Theory classes	12,00	100
Seminars	2,00	100
TOTAL	**30,00**	

TEACHING METHODOLOGY

Lectures/lectures

Practical laboratory sessions

Practical field sessions

Resolution of practical cases

Preparation and presentation of papers.

EVALUATION

Reports and class reports

Identification tests of plant remains

Practical work (laboratory and field notebook)

Field questionnaire

Evaluation of the resolution of practical cases

To pass the course you must obtain a minimum grade of 5 (in a0-10 scale) in each of the parts that are evaluated.

REFERENCES

Basic

- Stewart, W. N. (1983). Paleobotany and the Evolution of Plants. Cambridge University Press, New York. 405 p.
- Thomas, B. A. & Spicer, R. A. (1987). The Evolution and Palaeobiology of Land Plants. Croom Helm, London (Dioscorides Press, Portland, OR). 309 p.
- Taylor, E., Taylor, T & Krings, M. Paleobotany. The Biology and Evolution of Fossil Plants. Elsevier, Academic Press. 1230 p.

Additional

- Emberger, L. (1968). Les Plantes Fossiles dans leurs rapports avec les Végétaux Vivantes (Élements de Paléobotanique et de Morphologie Comparée). Masson et CIE, Paris. 758 p.
- Cleal, C. J. & Thomas, B. A. Fossils illustrated. Plant fossils. Boydell Press.
- Erwin, D. H. The great paleozoic crisis. Critical moments in paleobiology and earth history series.
- Bradley, R. S. Paleoclimatology. Reconstructing climates of the Quaternary. International geophysics series, volume 64. Hardcourt Academic Press