VNIVERSITAT DE VALÈNCIA

Course Guide
44293 Palaeoecology, palaeoclimatology and palaeobiogeography

COURSE DATA

Data Subject	
Code	44293
Name	Palaeoecology, palaeoclimatology and palaeobiogeography
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2021 - 2022

Study (s)

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

Subject-matter

Degree	Subject-matter	Character
2200 - M. U. en Paleontología Aplicada	1 - Fundamentals of palaeontology	Obligatory

Coordination

Name	Department
MARQUEZ SANZ, LEOPOLDO	200 - Geology

SUMMARY

Know and understand the most representative theories and hypotheses about the processes responsible for the origin of biodiversity, its types, its fluctuations and threats for the future, based on information obtained from past data.

Preparation for the teaching of biodiversity, especially in ecological and evolutionary aspects for future professionals of various educational levels interested in expanding their knowledge in these areas.

Introduction to research, both basic and applied, on different groups of living things of the past, and on all those issues and evolving nature of ecosystem biodiversity of other geological eras.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

The course is mandatory and courses in the second semester of the second year of the master; it explains how, from the study of the fossil record, we can reconstruct the lifestyles of organisms from the past, their communities and their partnership relations with the environments in which they lived. Thus, the paleoecology helps to better understand the complex interrelationships between the physical world and the biological world throughout the history of Earth.

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.
- 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.
- Be able to apply the research experience acquired to professional practice both in private companies and in public organisations.
- Be able to communicate and disseminate scientific ideas.
- Be able to plan and manage the resources available taking into account the basic principles of quality, risk prevention, safety and sustainability.
- Be able to apply the research experience acquired to begin the research phase of a doctoral programme in the field of biodiversity.
- 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.

- Asumir el compromiso ético y la sensibilidad hacia los problemas medioambientales, hacia el patrimonio natural y cultural.
- 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 entender la paleodiversidad de los seres vivos, sus relaciones ecosistémicas y la distribución paleogeográfica alcanzada por los principales grupos de seres vivos a lo largo de la historia de la Tierra.
- Conocer, entender y extraer conclusiones, aplicables al momento actual, sobre las crisis de diversidad biológica, sus causas y consecuencias en el marco del actualismo.
- Comprender en profundidad la naturaleza histórica del proceso evolutivo, tanto en sus aspectos de irrepetibilidad y contingencia, como en aquellos vinculados al cumplimiento de leyes de la naturaleza de toda índole y, por tanto, de necesidad.
- Conocer los principios fundametales del análisis de fácies en sistemas deposicionales continentales, transicionales y marinos, y el uso de los fósiles para la interpretación paleoambiental del registro estratigráfico.
- 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.

LEARNING OUTCOMES

Knowledge of fossilization processes and mechanisms of formation of fossil deposits.
Broad knowledge of the basic characteristics of the different groups of fossil organisms, the evolutionary mechanisms that originated and paleoenvironmental conditions in which these organisms evolved.
Introduction to research in paleontology: Sampling, excavation sites, laboratory work (Preparation of material, bibliography, classification, etc.), publication of the results, etc.
Conservation and management of paleontological heritage: Museums, collections, protection of deposits, etc.

DESCRIPTION OF CONTENTS

1. Paleoecology

Introduction, definitions and basic concepts. Marine and terrestrial environments. Lifestyles and trophic strategies. Large-scale global changes.

2. Environmental controls distribution of organisms

Introduction and basic concepts. Limiting factors: light, nutrients, oxygen, temperature, salinity, substrate and depth; study in paleoecology.

3. Taphonomy

Introduction. Pre-process and post-burial burial. Soft tissue preservation. Lagerstätten. Taphonomy of invertebrates, vertebrates and plants.

4. Adaptive morphology

Ways of life and types of growth. Study of organic form: paradigms, homologies, analogies, theoretical morphology. Adaptation and pre-adaptation. Form and way of life. Morphologies and environment in the prevendiense biota, Vendian, toommotiense, Cambrian, Paleozoic and modern.

5. Paleoichnology

introduction, types and mechanisms of formation of fossil brands. Ichnofacies sea. Ichnofacies land. Evolution of fossil brands.

6. The fossils as paleoenvironmental indicators

methodology. Indicators environments detrital and carbonate platforms, deep marine environments, in anoxic environments, hypo- and hypersaline environments, soft bottom, etc. Paleobathymetric indicators. Sedimentation rate calculations.

7. Populations and communities

Basics. Paleocommunities: Organization, interactions, succession, diversity patterns, spatial distributions, communities replacements, etc.

8. Paleobiogeography

Introduction, definitions and basic concepts. Identification of ancient biogeographic provinces. Paleobiogeography and evolution. Paleoclimatology: paleoclimatic indicators; climate cycles

9. Evolutionary paleoecology of the marine biosphere

Events diversification: origin of life, prokaryotes, eucariontas, metazoans, Ediacaran fauna, Cambrian explosion, evolutionary faunas Sepkoski (Cambrian, Paleozoic, modern). Models diversity of the Phanerozoic

10. Paleoecology of continental ecosystems

Conquest of the land domain: Primitive adaptations (plants, arthropods, molluscs, vertebrates), diversification and evolutionary advances, the conquest of the air. Terrestrial ecosystems through geological time: Palezoicos, Mesozoic and Cenozoic. Consequences of mass extinctions in terrestrial ecosystems.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	18,00	100
Laboratory practices	12,00	100
TOTAL	30,00	

TEACHING METHODOLOGY

Theoretical classes will be taught to provide the fundamental knowledge that will cover the basics of the program also can be made guided by the teacher, consisting of the study in detail specific examples or the discussion on certain aspects of the program) seminars.

One practice field one day in which were observed on the ground, various aspect addressed in lectures and seminars will be held. All observed will be reflected in a report to be made by each student. The date of the field trip will be agreed with the students.

EVALUATION

The evaluation of the subject will consist of:

Theoretical exam: ..... 8 points

Memory field practice: ..... 2 points

Another option: Bibliographic work to evaluate the Subject as a whole ..... 10 points

These criteria are valid for two calls.

REFERENCES

Basic

- B. Melendez (1998). Tratado de Paleontología. Tomo I (3ª edición). Colección Textos universitarios N 29. Consejo Superior de Investigaciones Científicas. 1-457.
Brenchley, P.J., Harper, D.A.T. (1998). Palaeoecology: Ecosystems, environments and evolution. Chapman & Hall. 1-402.
Briggs, D. & Crowther, P.R. (1990). Palaeobiology: A Sinthesis. Blackwell Sci. Publi.
Briggs, D. & Crowther, P.R. (2001). Palaeobiology II. Blackwell Sci. Publi.
Dodd, J.R. (1981) Paleoecology, Concepts and Applications. John Wiley and Sons (Ed.). 559 p.
Valentine, J.W. (1973) Evolutionary paleoecology of the marine biosphere. Prentice-Hall (Eds.). 511 p.
Gould, S.J. Diversos titulos Ed. Blume y Ed. Crítica.
Gould, S.J. (2004) La estructura de la teoría de la evolución. Colección metatemas nº 82. Ed. Tusquets. 1426 p.
Raup, D.M. & Stanley, S.M. (1978) Principles of Paleontology. Freeman Ed. (hay versión en español Ed. Ariel).
Allmon, W. & Botjer, D.J. (2000). Evolutinary Paleoecology.
Hembree, D.I. (2006). Biogenic structures of modern and fosssil continental organisms: Using trace fossil morphology to interpret paleoenvironment, paleoecology and paleoclimate.
Kelley, P.H., Kowalewski, M & Hansen, T.A. (Ed.) (2003). Predator-Prey Interactions in the Fossil Record. Topics in Geobiology, vol. 20

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

1. Continguts / Contenidos

1. *1.* *Se mantienen los contenidos inicialmente recogidos en la guía docente*

2. Volum de treball i planificació temporal de la docència

2. Volumen de trabajo y planificación temporal de la docencia

(text) / (texto)

1. *1.* *Mantenimiento del peso de las distintas actividades que suman las horas de dedicación en créditos ECTS marcadas en la guía docente original.*

3. Metodología docente

3. Metodología docente

(text) / (texto)

1. *1.* *Subida de materiales al Aula virtual*

4. Avaluació

4. Evaluación

1. *1.* *Pruebas de evaluación mediante trabajos académicos*

5. Bibliografia

5. Bibliografía

1. *1.* (text) / (texto) *La bibliografía recomendada se mantiene pues es accesible*