

**COURSE DATA****Data Subject**

Code	44305
Name	Applied micropalaeontology
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2023 - 2024

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	4 - Palaeontology applied to the exploration of geological resources and to environmental studies	Optional

Coordination

Name	Department
RUIZ SANCHEZ, FRANCISCO JAVIER	356 - Botany and Geology

SUMMARY

Micropaleontology is a discipline that studies life in the past and the evolution of the biosphere from small fossils. Special techniques of sampling, preparation and observation through the optical or electron microscope are used for this study.

This course analyzes the taxonomy, systematics and the different applications of microfossils in Geology. Micropaleontology is a discipline applied to diverse geological and environmental fields. It is especially useful in the analysis of basins, biostratigraphic or paleoecological with a clear projection towards environmental aspects and those related to climate change.



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.
- 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 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 bioestratigráficas y fosildiagenéticas del proceso y los mecanismos de fosilización.
- 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 y comprender los eventos biológicos del pasado, así como las zonaciones, en el tiempo y en el espacio, de las biotas en orden a establecer la posición estratigráfica relativa de las rocas sedimentarias de zonas geográficas diversas.
- 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 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.)
- Desarrollar las habilidades experimentales en el manejo de material y equipos de laboratorio en paleontología.

LEARNING OUTCOMES

- To know the different applications of the main groups of microfossils in geology. In particular, paleoecological, biostratigraphic, biogeographic and evolutionary applications.
- To recognize the main groups of microfossils in hand and microscopic samples.
- To know the main micropaleontological techniques for the extraction and study of microfossils.
- To know the processes of taxonomic alteration of the different groups of microfossils and their interpretation at the moment of evaluating the information in the deposit or sample.

DESCRIPTION OF CONTENTS

1. Fundamentals of Micropaleontology

Concept, history and current status of Micropaleontology.
Micropaleontology studies in Spain.



2. Systematics I: Foraminifera

Shell biology, structure and organization. Great extinctions. Ecology and Paleoecology. Biostratigraphy and evolution.

Classification: Phylum Foraminifera. Monothalamids; Class Tubothalamea: Order Miliolida, Order Spirillinida. Class Globothalamea: Order Rotaliida, Order Robertinida, Order "Textulariida", Order Carterinida.

Orders Incertae sedis: Order Lagenida, Order Fusulinida, Order Involutinida

3. Systematics II: Radiolarians, Diatoms, Silicoflagellates, Cocolithophorids and other calcareous nanofossils

Radiolarians: Biology. Morphology. Classification, Ecology, Paleoecology and Evolution.

Diatoms: Biology. Leaflet morphology. Classification, Ecology and Paleoecology.

Silicoflagellates: Biology. Morphology and classification. Evolution of the group. Ecology and Paleoecology.

4. Systematics III: Calcareous Algae, Tintinids, Dinoflagellates and Chitinozoans

Calcareous algae: General aspects of their biology. Evolution and fossil record.

Tintinids: Biology of present-day Tintinids. The lorica of fossil Tintinids. Preparation of specimens. The fossil record of Tintinids.

Dinoflagellates: Morphology. Systematics. Biology and ecology. Fossil record.

Chitinozoa: Morphology. Systematics. Ecology and evolution.

5. Systematics IV: Ostracoda

Biology. Morphology of the valves. Classification. Limiting ecological factors. Paleoecology. Evolutionary history.

6. Systematics V: Conodonts

Systematic position of conodonts. Paleobiological interpretation. Morphology of conodont elements. Paleoecology and biostratigraphy.

Industrial applications of conodonts: evaluation of hydrocarbon and other fossil fuel reserves.

7. Systematics VI: Rodents and insectivores

Morphology, systematics, palaeoecology, stratigraphic and geographic distribution, diversity and evolutionary history (main radiation and extinction events; ecological dominance).

**8. Systematics VII: Chiroptera and Lagomorphs**

Morphology, systematics, palaeoecology, stratigraphic and geographic distribution, diversity and evolutionary history (main radiation and extinction events; ecological dominance).

WORKLOAD

ACTIVITY	Hours	% To be attended
Classroom practices	18,00	100
Theory classes	10,00	100
Seminars	2,00	100
TOTAL	30,00	

TEACHING METHODOLOGY

Lectures/lectures

Practical laboratory sessions

Practical field sessions

Resolution of practical cases

Preparation of assignments

EVALUATION

Class reports and memories

Practical work (delivery of laboratory and field notebook).

Field questionnaire

Evaluation of the resolution of practical cases

Questionnaire on theoretical aspects.

REFERENCES**Basic**



- Brasier, G. 1980. Microfossils. George Allen & Unwin. Londres. 193 pp.
- Haq, B.U. & Boersma, A. Ed. 1978. Introduction to marine Micropaleontology (reed. 1998). Elsevier. Nueva York. 376 pp.
- Molina, E. (Ed.) 2002: Micropaleontología. Prensas Universitarias de Zaragoza. Zaragoza, 634 pp.
- Daams, R., Meulen, A.J., Álvarez-Sierra, M.A., Campomanes, P., Krijgsman, W., 1999. Aragonian stratigraphy reconsidered, and a re-evaluation of the middle Miocene mammal biochronology in Europe. *Earth and Planetary Science Letters* 165, 287294.
 - Freudenthal, M., Daams, R., 1988. Cricetidae (Rodentia) from the type Aragonian; the genera *Democricetodon*, *Pseudofahlbuschia* nov. gen. and *Renzimys*, 133252. In FREUDENTHAL, M. (ed.) *Biostratigraphy and paleoecology of the Neogene micromammalian faunas from the Calatayud-Teruel Basin (Spain)*, *Scripta Geologica Special Issue* 1.
 - Ruiz-Sánchez, F.J., 1999. Estudio paleontológico de los roedores fósiles del Mioceno inferior de la cuenca del río Magro (Valencia). Ph.D. Thesis, University of Valencia (unpublished).
 - Ruiz-Sánchez, F.J., de Santisteban, C., Lacomba, J.I., 2003. Nuevas faunas de roedores fósiles (Mammalia, Rodentia) de edad Aragoniense inferior y medio en la serie del Barranco de Morteral (cuenca del río Magro, prov. de Valencia, España). *Coloquios de Paleontología* 1, 579 594.
 - Sesé, C. 2006. Los roedores y lagomorfos del Neógeno de España. *Estudios Geológicos* 62, 429480.
 - Sweet, W. C 1988: The Conodonta. Morphology, Taxonomy, Paleoecology, and Evolutionary History

Additional

- Sweet, W. C 1988: The Conodonta. Morphology, Taxonomy, Paleoecology, and Evolutionary History of a Long-Extinct Animal Phylum. *Oxford Monographs on Geology and Geophysics* 10, 224 p., 96 Text-Figs., 13