COURSE DATA

DATA SUBJECT

Code: 46745
Name: Applied micropalaeontology
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	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2266 - Master's Degree in Applied Palaeontology	Palaeontology applied to the exploration of geological resources and to environmental studies	ELECTIVES

COORDINATION

MARTINEZ PEREZ CARLOS

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.

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.

Assess the need to complement their scientific, historical, language, IT, literature, social and human ethics education by attending lectures or courses and/or carrying out complementary activities, self-evaluating the contribution that these activities make to their overall education.

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.

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

Have an in-depth knowledge and understanding of the regional geology of Spain and surrounding areas, particularly the Valencian Community, with detailed knowledge of the main palaeontological sites found in the Iberian Peninsula and North Africa.

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.

Interpret environmental and ecological variables of the past from the study of organism traces in the fossil record.

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.

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.)

Skillfully handle the field, laboratory and office techniques for the extraction, preparation, cataloguing, digital reconstruction, study and dissemination of microfossils and macrofossils.

Understand the causes of climate change and the proxies used (diatom studies, foraminifera, tree growth rings, ice cores, current climate data, etc.) to characterise past climates.

Understand the fundamental principles of facies analysis in continental, transitional and marine depositional systems, and the use of fossils for palaeoenvironmental interpretation of the stratigraphic record.

Understand the fundamentals of the use of microfossils and macrofossils for the characterisation of

geological deposits containing resources such as oil, gas, coal, peat, etc.

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. 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 loriga 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.

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

5. Systematics IV: Ostracoda

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

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	10,00
Seminar	2,00
Classroom practices	18,00
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	0,00
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**0,00**

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

- 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., 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, Espana).

Coloquios de Paleontología 1, 579594. -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

- 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.