26421 - Micropalaeontology

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	296 - Degree in Geology
ECTS	6.0
Year	3
Semester	Second semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

General aims: To learn and practice the micropaleontological techniques. The most relevant microfossil groups in applied micropaleontology will be studied and interpreted in terms of evolution, biostratigraphy and paleoecology. Introduction to the scientific research by means of the study of a micropaleontological sample.

5.2.Learning tasks

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1. Participatory Lectures: 25 contact hours.

2. Laboratory practices and study of a micropaleontological sample for the practical work: 31 contact hours.

3. Field practice (at Arguis-Monrepós, Huesca): 4 contact hours

4. Overcoming of written test (completion of the exam): 2 contact hours.

5. Study of theoretical knowledge and development of the practical work: 90 non-contact hours (autonomous student work).

5.3.Syllabus

List of themes:

Part I: Fundaments

Theme 1 . Micropaleontology. Concept, history and present state of the concept : Aims, programming and evaluation. Concept. History of Micropaleontology. Interest and relation with other disciplines. Applied Micropaleontology.

Theme 2 . Methodology. Samplings, laboratory techniques and research methods : Methodology of sampling and collecting materials. Laboratory preparation techniques. Observational methods, study and classification. Methods based on informatics software.

Theme 3 . Taphonomy. Particularities of microfossil fossilization : Taphonomy and Micropaleontology. Production processes. Biostratinomic processes. Fossildiagenetic processes. Lithogenetic relevance.

Theme 4 . The microfossils and the biological classification : The biological classification. Taxonomy and systematic. The biological classification in Micropaleontology.

Part II: Systematic

Theme 5 . Foraminifers: Biology, organization of the shell and classification : General characteristics. Biology of

foraminifera. Organization of the shell. Classification. Origin and evolution.

Theme 6 .Planktic Foraminifera. Globigerinina : Biology. Systematic. Evolution and extinction. Biostratigraphy. Ecology and paleoecology. Taphonomy and fossilization.

Theme 7 . Benthic Foraminifera. Lagenina, Involutinina, Robertinina,... : General characteristics and classification. Suborders Lagenina, Involutinina, Robertinina, Spirillinina, Carterinina and Silicoloculinina.

Theme 8 . Benthic Foraminifera. Rotaliina : General characteristics and classification. Microforaminifera (serial and spiral forms). Larger Foraminifera (orbitoidids, orthofragminids, lepidocyclinids, nummulitids, etc.). Evolution and extinction. Biostratigraphy. Paleoecology.

Theme 9 . Benthic Foraminifera. Miliolina : General characteristics and classification. Microforaminifera (cornuspiroids and milioloids). Larger foraminifera (soritoids and alveolinoids). Evolution and extinction. Biostratigraphy. Paleoecology.

Theme 10 . Benthic Foraminifera. Fusulinina : General characteristics and classification. Parathuraminoids, endothiroids and fusulinoids. Evolution and extinction. Biostratigraphy. Paleoecology.

Theme 11 . Benthic Foraminifera. Allogromiina and Textulariina : General characteristics and classification. Suborder Allogromiina. Suborder Textulariina. Orbitolinoids. Evolution and extinction. Biostratigraphy. Paleoecology.

Theme 12 . Radiolaria : General characteristics. Biology, morphology and classification. Evolution. Ecology and paleoecology. Biostratigraphy. The radiolaritics genesis.

Theme 13 . Tintinids : History of their study. Biology of recent tintinids. The loriga of fossil tintinids. Sample preparations. Fossil record of tintinids. Calpionellids and related microfossils. Paleobiogeography. Biostratigraphy.

Theme 14. Bacteria: Biology. Classification. Metabolism. Ecology. Cianobacteria: their relevance as stromatolith builders. Other examples of bacterial sedimentogenesis.

Theme 15 . Coccolitoforids and other calcareous nannofossils : General characteristics. Biology. Morphology of coccolits. Classification. Evolution. Ecology and paleoecology. Biostratigraphy.

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Theme 16 . Diatoms and silicoflagelates : Groups of siliceous nannoplankton. General characteristics and classification. Diatoms (Bacillariophyta). Silicoflagellates (Silicoflagellata).

Theme 17. Dinoflagelates, acritarcs and quitinozoa: Groups of organic nannoplankton. General characteristics and classification. Dinoflagellates. Acritarcs. Quitinozoa.

Theme 18. Polen and spores: Morphology. Classification. Interests and limits in Micropaleontology. Taphonomy. Palaeoenvironmental reconstruction. Evolution and extinction.

Theme 19. Calcareous algae: General characteristics and classification. Red algae (Rhodophyta). Green algae (Chorophyta). Charophyta.

Theme 20 . Briozoa : General characteristics and classification. Biology. Systematic (Stenolaemata, Gymnolaemata and Phylactolaemata). Evolution and extinction. Biostratigraphy. Paleoecology.

Theme 21 . Ostracods : Biology. Morphology of the valves. Ontogenetic variability and sexual dimorphism. Classification. Ecological limiting factors. Paleoecology. Biostratigraphy. Evolution and extinction.

Theme 22 . Other microfossil groups and incertae sedis : Spicules of porifera. Sclerites of alcionaria. Sclerites of holothurians. Microbraquiopods. Pteropods. Statolits and conchostraceans. Scolecodonts. Ascidians. Tecamoebians. Incertae sedis microfossils.

Theme 23 . Conodonts : Fossil record of primitive cordata. Paleobiologic interpretation. Morphology of the conodontal elements. Composition, structure and growth. Natural associations. Paleoecology. Evolution and extinction. Biostratigraphy.

Theme 24. Others vertebrate microfossils: The skeleton of vertebrates. Fossil eggshells. Main microvertebrate groups. Tafonomy and paleoecology. Stratigraphic paleontology.

Part III: Applications

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Theme 25 . Paleoecology and paleoenvironmental reconstruction by microfossils : Ecology and Paleoecology. Limiting factors. Classification of marine environments. Paleoenvironmental reconstruction. Quantitative analyses. Isotopic analyses: paleotemperatures and productivity.

Theme 26 . Global paleobiogeography and paleogeography by microfossils : Areas of distribution and mechanisms of dissemination. Barriers of dispersion. Distribution of the micropaleontological groups in oceanic environments. Paleobiogeography by microfossils and continental drifting.

Theme 27 . Biostratigraphy. Limits and advantages of microfossils : Biostratigraphic units. Microfossils as guide taxa. Biozonations in Micropaleontology. Limitations of the biostratigraphic scale. Conceptual foundations of Biostratigraphy and Biochronology.

Theme 28 . Methods of stratigraphic correlation by microfossils: Biostratigraphic methods. Biomagnetostratigraphic methods. Filogenetic methods. Ecobiostratigraphic methods. Quantitative and statistic methods. Quimiostratigraphic methods. Ciclostratigraphic methods. Eventostratigraphic methods. Applications of microfossils to the chronostratigraphic and geochronologic scales. Interest and utility of microfossils biostratigraphy in Geology and associated industry.

Theme 29 . Evolution. Modes and causes of evolution and extinction by microfossils : Evolution and species. Modes of evolution. Biodiversity. Extinction: patterns of extinction and causes.

Theme 30. Origin of life and evolution of the microbiota during the Precambrian: The Hadean Eon: beginning of prebiotic evolution. The Archean Eon: a bacterial planet. The Proterozoic Eon: a changing world.

Theme 31. General history of microbiota. Microfacies : Brief history of the Phanerozoic microbiota. Analysis of microfacies of carbonate rocks. Examples of microfacies in thin sections.

Laboratory practices:

Learning and training in the micropaleontological techniques. Identification of the most useful microfossils and their application to the solution of biostratigraphic, paleocologic and evolutive problems. Study of a micropaleontological sample, as practice individual research, during the second half of each practical session.

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Practice 1. Taphonomy. Types and groups of microfossils.

Practice 2. Organization of foraminifera. Thin section technique.

Practice 3. Planktic foraminifera (Globigerinina). Washing levigate technique.

Practice 4. Benthic foraminifera (Lagenina and small rotaliina).

Practice 5. Benthic foraminifera (larger foraminifera). Oriented section technique.

Practice 6. Benthic foraminifera (Textulariina). Rocks with abundant foraminifera.

Practice 7. Radiolaria, tintinids and nannofossils. Smear technique.

Practice 8. Polen and spores, calcareous algae and briozoa.

Practice 9. Ostracods and other invertebrate microfossils.

Practice 10. Conodonts and vertebrate microfossils. Rocks with other microfossils.

Practice 11. Microfacies.

Field trip:

Excursion to the Cretaceous and Tertiary of Arguis-Monrepós (Huesca)

5.4.Course planning and calendar

Timing : 2 hours per week of theory (2.5 credits), 2,5 hours per week of practices (3.1 credits) and one field trip (0.4 credits). These activities summarize 6 credits, which are distributed along 13 weeks in the second semester. Theory: Monday and Tuesday from 12 to 13 hours. Practices: Tuesday from 15.30 to 18 hours and from 18 to 20.30 hours and Wednesday from 12 to 14.30 hours.

5.5.Bibliography and recommended resources

[BB: Bibliografía básica / BC: Bibliografía complementaria]

- [BB] Applied micropalaeontology / edited by David Graham Jenkins Dordrecht [etc.] : Kluwer Academic, cop. 1993

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- [BB] Bignot, Gérard. Los microfósiles : los diferentes grupos : aplicaciones paleobiológicas y geológicas / Gerard Bignot Madrid : Paraninfo, 1988
- [BB] Brasier, M.D.. Microfossils / M.D. Brasier . - 1st published London [etc.] : George Allen & Unwin, 1980
- [BB] Cita, Maria Bianca. Micropaleontologia / Maria Bianca Cita . - 3a. ed. completamente rifatta Milano : Cisalpino-Goliardica, cop. 1983
- [BB] Environmental micropaleontology : the application of microfossils to environmental geology / edited by Ronald E. Martin Dordrecht [etc.] : Kluwer Academic Publishers, 2000
- [BB] Introduction to marine micropaleontology / edited by Bilal U. Haq, Anne Boersma ; contributors, W. A. Berggren ... [et al.] . - 1st ed., reimp. New York [etc.] : Elsevier, cop. 1998
- [BB] Micropaleontología / Eustoquio Molina (editor) . - 2a ed. Zaragoza : Prensas Universitarias de Zaragoza , D. L. 2004
- [BB] Molina, E. 1998. Micropaleontología. Capítulo X. En: Meléndez, Bermudo. Tratado de paleontología / Bermudo Meléndez. Tomo I, [Cuestiones generales de paleontología] / Bermudo Meléndez; [con la colaboración de Sixto Fernández López...(et al.)] . - 3a. ed. amp. y rev., por Guillermo Meléndez Hevia Madrid : Consejo Superior de Investigaciones Científicas, 1999
- [BB] Pokorny, Vladimir. Principles of zoological micropalaeontology / Vladimir Pokorny ; translated by K.A. Allen ; edited by John W. Neale Oxford : Pergamon Press, 1963-1965
- [BB] Rivero Palacio, Frances Charlton de. Micropaleontología general / por Frances Charlton de Rivero Palacio y Pedro Joaquín Bermúdez [Caracas?] : Universidad Central de Venezuela, 1963 |e(Barcelona :|fGráficas Condal)
- [BB] Tappan, Helen Niña. The paleobiology of plant protists / Helen Tappan San Francisco : W. H. Freeman, cop. 1980
- [BC] Armstrong, H.A.. Microfossils. Blackwell Publishing / Armstrong, H.A. y Brasier M.D. Blackwell Publishing (2005)
- [BC] Jones, R.W.. Micropalaeontology in Petroleum Exploration Clarendon Press (1996)
- [BC] Lipps, J.H. (ed.). Fossils Prokaryotes and Protists Blackwell (1993)
- [BC] Moguilevsky, Alicia. Microfossils and Oceanic Environments / Alicia Moguilevsky and Robin Whatley University of Wales Aberystwyth (1996)

Listado de URL

- Centro de Micropaleontología Dr. P.J. Bermúdez [http://www.pdvsa.com/lexico//centro/micropaleontologia.htm]
- Equipo de Micropaleontología, Universidad de Zaragoza [http://micropal.unizar.es/index_es.php]
- The Grzybowski Foundation (Micropaleontology) [http://www.es.ucl.ac.uk/Grzybowski/]
- The Micropaleontological Society [http://www.tmsoc.org/]