

Marine Paleobiology

Code: 43859
ECTS Credits: 15

Degree	Type	Year	Semester
4316238 Paleobiology and Fossil Record	OT	0	A

Contact

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Use of languages

Principal working language: english (eng)

Teachers

Victor Fondevilla Moreu

Rosa Domènech Arnal

Carme Boix Martinez

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External teachers

Carles Ferrández Cañadell

Prerequisites

Previous knowledge of Invertebrate paleontology and micropaleontology could be useful.

Objectives and Contextualisation

This module is focussed on the fossil register of marine settings. The main groups of marine organisms from the Phanerozoic are outlined, their main morphological characteristics are described, as well as their application in paleoecology, biostratigraphy and paleobiogeography. The evolution of the marine carbonate platforms and associations of fossil organisms that characterized them, from coastal environments to open platform is studied, as well as the traces resulting from the interaction between the activity of these organisms and sediment.

Skills

- Apply evolutionary concepts to resolve geological problems related to the time-ordering of fossils and the sediments that contain them.
- Bring the necessary paleontological knowledge for the geology of exploration to the georesources exploitation industry.
- Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
- Continue the learning process, to a large extent autonomously.
- Defend the results, respecting and discussing those of others in English.

- Design and carry out research projects in paleobiology and communicate and disseminate the results of the knowledge acquired.
- Gather and synthesize information from scientific literature (library, data bases, online journals, contrasted web pages).
- Identify fossilization processes and avoid taphonomic biases in the study of the biology of organisms from the past.
- Obtain original data by means of field or lab work and process them adequately to resolve questions of a paleobiological profile.
- Recognize and use the fossil record applying the theories, paradigms and concepts of evolution and ecology to resolve specific problems of life in the past.
- Show a critical and self-critical capacity.
- Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
- Use a scientific argument in English to justify research results .
- Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
- Use paleontological, geological, biological, chemical or physical sources of information to delimit ecological parameters in the past.

Learning outcomes

1. Apply knowledge of comparative anatomy, phylogeny, taxonomy and ecology to analyse the evolution of fossil invertebrates and foraminifera.
2. Apply the appropriate methodology for the study of fossil invertebrates and foraminifera.
3. Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
4. Continue the learning process, to a large extent autonomously.
5. Control working methodologies in ichnology.
6. Defend their own results, respecting and discussing the results of others.
7. Describe fossil traces using the appropriate terminology.
8. Establish biostratigraphic series to contribute to the correlation of lithostratigraphic units in hydrocarbon prospecting.
9. Establish biostratigraphic units.
10. Gather and synthesize information from scientific literature (library, data bases, online journals, contrasted web pages).
11. Identify common fossil traces in the fossil register.
12. Identify the main groups of living organisms represented in the marine fossil register.
13. Integrate different local stratigraphic units and integrate them with the formally established international standards.
14. Integrate ichnodata in sedimentary and paleoenvironmental studies.
15. Recognise and use of the fossil register for invertebrates and microfossils.
16. Recognise fossil groups of biostratigraphic use.
17. Recognise the fossil register for foraminifera, invertebrates and vertebrates in the field.
18. Relate concepts in the area of basin analysis and disseminate the results.
19. Relate concepts in the field of ichnology and disseminate the results.
20. Relate concepts in the files of invertebrate paleontology and micropaleontology and disseminate the results.
21. Relate the fossil register for invertebrates and foraminifera with their chronostratigraphic context.
22. Relate the fossil register for invertebrates and foraminifera with their paleoenvironmental context.
23. Relate the fossil register to its chronostratigraphic context.
24. Show a critical and self-critical capacity.
25. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
26. Solve stratigraphic problems.
27. Understand the contribution of ichnological data to the knowledge of evolution of the biosphere.
28. Understand the contributions of ichnology to sedimentary geology.
29. Understand the fossil microorganisms which characterise the microfacies that define carbonate reservoirs in hydrocarbon prospecting.
30. Understand the interaction between biogenic activity and sedimentation.

31. Understand the paleoenvironmental significance of bioerosion structures.
32. Understand the paleoenvironmental significance of fossil traces and the relation between the organisms, their ethology and the paleoenvironment.
33. Understand the processes of bioerosion bioturbation and biodeposition.
34. Understand the processes of skeleton formation in invertebrates and their characteristics.
35. Understand the role of bioturbators in benthic systems.
36. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
37. Use scientific argumentation to justify the results of research.

Content

Micropaleontology: Main microfossil groups present in the geological record. Microstructures, morphologies and paleoenvironmental applications. Foraminifera and their use in Mesozoic and Cainozoic paleoecology and biostratigraphy. Use and description of microfacies of carbonate rocks.

Biostratigraphy: Basic principles of biostratigraphy. Concepts of biozone, biohorizon and correlation. The use of specific fossil groups to date sediments comprised between Paleozoic and Caenozoic. The application of fossils in lithostratigraphic correlation.

Paleozoology of marine settings: Main groups of organisms from marine settings and their evolution in the geological time. The fossil record and evolutionary radiation of marine organisms. Changes in marine ecosystems based on data from different marine fossil groups.

Ichnology: The basis and tools for the study of the interaction between organisms and substrate. The importance of the ichnological record in paleoecological and paleoenvironmental interpretations. Application of the ichnology in geology and its contribution to the knowledge of the Biosphere evolution.

Methodology

Theory lectures
 Practical classes
 Problem-based learning
 Seminars
 Field trips
 Delivery of works
 Oral presentation of works

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Lectures and Seminars	75	3	12, 15, 16, 17, 21, 27, 28, 30, 31, 32, 33, 34, 35
Type: Supervised			
Field Trips	15	0.6	2, 5, 7, 8, 11, 12, 17, 19, 21, 23, 28, 29, 30, 34, 35
Practical classes and Seminars	97	3.88	2, 4, 7, 11, 12, 15, 16, 17, 21, 23, 25, 34, 36
Type: Autonomous			
Preparation, delivery and presentation of works and	188	7.52	3, 4, 5, 6, 10, 18, 20, 24, 25, 36, 37

Evaluation

Exams 40%

Delivery of reports/ works 30%

Class exercises 20%

Attendance and participation at class 10%

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Attendance and participation at class	10%	0	0	3, 6, 10, 24, 25, 36, 37
Class exercises	20%	0	0	1, 2, 3, 4, 6, 7, 10, 12, 15, 16, 18, 20, 22, 24, 25, 26, 36, 37
Delivery of reports/ works	30%	0	0	2, 3, 4, 6, 8, 9, 10, 16, 18, 20, 23, 24, 25, 26, 27, 29, 33, 34, 35, 36, 37
Exams	40%	0	0	1, 2, 3, 4, 5, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37

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