Universitat Autònoma de Barcelona

2019/2020

Concepts in Evolutionary Paleobiology

Code: 43857
ECTS Credits: 9

Degree	Type	Year	Semester
4316238 Paleobiology and Fossil Record	OB	0	1

Contact

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Use of Languages

Principal working language: english (eng)

Teachers

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Prerequisites

There is no particular prerequisites other than the complementary formation established in the master's regulations.

Objectives and Contextualisation

This module provides a general overview on Paleobiology.

Thus, the student is expected to get an appraisal of the basic keypoints on the current and leading theories and hypothesis on evolution, extinction, biodiversity, history of life in the Earth, and fossilization.

Competences

- Analyze data using adequate mathematical tools.
- Apply evolutionary concepts to resolve geological problems related to the time-ordering of fossils and the sediments that contain them.
- 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.
- 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.
- Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
- 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. Analyze data using adequate mathematical tools.
2. Communicate and justify conclusions clearly and unambiguously to both specialised and non-specialised audiences.
3. Consider fossils as the most evident proof of biological diversity in the past.
4. Continue the learning process, to a large extent autonomously.
5. Defend their own results, respecting and discussing the results of others.
6. Describe the main events in life in the past using the current biodiversity on a planetary scale.
7. Gather and synthesize information from scientific literature (library, data bases, online journals, contrasted web pages).
8. Identify and understand the taphonomic processes controlling the fossilization of organic remains.
9. Integrate knowledge and use it to make judgements in complex situations, with incomplete information, while keeping in mind social and ethical responsibilities.
10. Know fossil characteristics for each paleoenvironment to recognise their characteristics.
11. Make a sequence of the set of taphonomic processes undergone by a fossil element in context and establish taphonomic cases.
12. Show a critical and self-critical capacity.
13. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.
14. Understand the different mechanisms of evolutive speciation and their evidence or contradictions with the fossil register.
15. Understand the evolutionary changes in the biosphere based on the fossil register and apply them to recognise different stratigraphic units, their limits and their relationships.
16. Understand, recognise and analyse the evolutive aspects evident in the succession of the fossil register.
17. Use acquired knowledge as a basis for originality in the application of ideas, often in a research context.
18. Use scientific argumentation to justify the results of research.

Content

Patterns in Paleobiology. Natural selection, adaptation, and evolutionary constrictions. Tempo and mode of evolution. Dynamics of paleobiodiversity. Macroecological patterns. Heterochronies: concept, types and examples. Evolution in islands.

History of life and the earth. History of life in the context of the history of the earth. Life throughout geological times: from the unicellular Precambrian world to the Anthropocene. The great radiation of the Cambrian. Appearance and evolution of the main phyla. Adaptive radiation and massive extinctions throughout the history of the Earth. Paleobiology and relationship with climatic changes, paleogeographic variations, volcanism and astronomical phenomena.

Advanced concepts in Paleobiology. Auxiliary tools for paleobiological interpretation. Processes of taphonomic alteration in continental and marine media. Taphonomy of the Fossil-lagerstätten. Deposits of exceptional conservation of marine and continental origin. Fossil concentrations. Temporary homogenization. Cave taphonomy. Taphofacies. Paleoecological analysis, populations and analysis of fossil communities. Colonial organisms, stromatolites and bioconstructions. Reconstruction of ancient communities. Relations between organisms: predation, forestry, parasitism, evidence of diet, pollination. Paleoenvironmental indicators. Biofacies.

Methodology

Lecture

Practical classes

Learning based in problems

Written Work

Reading of Scientific Papers and Books

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Learning based in problems	44	1.76	1, 12, 7, 9, 13, 17, 18
Lecture	44	1.76	16, 3, 15, 14, 10, 8, 9, 4, 6, 11
Practical classes	10	0.4	3, 10, 7, 9, 13, 4, 11, 17
Reading of Scientific Papers and Books	25	1	10, 5, 12, 7, 4, 6, 18
Written Work	90	3.6	1, 3, 14, 5, 12, 7, 9, 13, 2, 18

Assessment

Attending and Participation in Classes

Exams

Written Works

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attending and Participation in	20%	0	0	5, 12, 7, 9, 13, 2, 4, 17, 18

Classes				
Exams	40%	6	0.24	1, 16, 3, 15, 14, 10, 8, 13, 6, 11
Written Work	40%	6	0.24	1, 16, 3, 15, 14, 10, 5, 12, 8, 7, 9, 13, 2, 4, 6, 11, 17, 18

Bibliography

Benton, M.J. & Harper, D.A.T. 2009. Introduction to Paleobiology and the Fossil Record.

Gradstein, F.M., Ogg, J.G., Schmitz, M, Ogg, G. (2012). The geological time scale. ElsevierI SBN-13: 978-0444594259

www.stratigraphy.org/index.php/ics-chart-timescale