UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Conservation Paleobiology

2627-2-F7504Q023

Aims

The course will provide knowledge in the field of Conservation Paleobiology.

D1: Knowledge and Understanding
Students will acquire strong skills in Conservation Paleobiology, that is the use of historical data and fossils to support conservation efforts for ecosystems (particularly marine ecosystems) and extant species, while gaining an understanding of the importance of the temporal perspective in conservation biology for identifying the appropriate ecological baseline and provide robust approach in remediation and restoration programs. They will acquire the theoretical and practical skills to use historical and fossil records for conservation purposes, including the analysis of key case studies. They will learn the main principles of the laws of taphonomy. They will gain a solid understanding of the main dating methods applicable to the Quaternary period, during which the major stages of climate evolution will be reconstructed. Finally, they will acquire knowledge of the main statistical methods applied in the discipline.

D2: Applying knowledge and understanding
Students will be able to apply the knowledge they have acquired by identifying their own original case study, on which they will develop hypotheses and design a research project, identifying the most appropriate methods for testing those hypotheses (from the collection to the analysis of real data), as well as interpreting and finally communicating the results.

D3: Autonomy of Judgments
Students will be able to independently develop a critical approach to the study of natural marine environments by integrating the most appropriate timescales and methodologies for reconstructing events of change and defining an ecological baseline useful for planning restoration actions.

D4: Communication Skills
Students will be able to articulate the knowledge they have acquired using appropriate language through the presentation of an original project in Conservation Paleobiology during their oral exam.

D5: Learning Skills
Students will be able to apply the skills and concepts they have acquired to interpret real-world phenomena, both current and historical, through the development of an original case study in Conservation Paleobiology.

Contents

Conservation paleobiology: what it is and its main principles.
The concept of ecological baseline and shifting baseline.
The main laws of taphonomy.
Quaternary dating methods.
Survey, sampling, and analysis methodologies.
Mollusks as a tool in conservation paleobiology.
Sclerochronology and geochemistry.
Statistical methods for data analysis.
Case studies.

Detailed program

Lectures. Unless otherwise specified, the course is taught in a Delivered didactics.
The principles of conservation paleobiology: “put the dead to work” (Interactive teaching).
Introduction to the fossil record, spanning the recent and distant past
The concepts of ecological baselines and shifting baselines.
The laws of burial and taphonomy, with a focus on corals and mollusks.
The use of mollusks in Conservation Paleobiology (Interactive teaching).
The main techniques for dating Quaternary fossil remains.
The principles of sclerochronology and sclero-chemistry, using isotopes and trace elements to measure climate dynamics and changes that occurred during the Quaternary (Interactive teaching).
Univariate and multivariate analysis in the field of Conservation Paleobiology.
The main sampling and processing techniques in Conservation Paleobiology (Interactive teaching).

Part of the program will be conducted in an interactive, student-centered format, beginning with the analysis of case studies and progressing to the theoretical exploration of key concepts.
This approach will allow students to explore certain theoretical concepts by starting with their direct application through the analysis of real-world case studies, while also encouraging the comparison of different sources. Furthermore, it will encourage students to identify their own original case study, which they will use to develop their project during the scheduled practical sessions.

Practical Sessions: Development of a Conservation Paleobiology project.

Prerequisites

Geobiology, Marine ecology, Marine biology.

Teaching form

- 11 two-hour lectures + 1 three-hour lecture, Delivered didactics (25 hours, 3.5 CFU)
- 5 two-hour lectures, Interactive didactics (10 hours, 1.5 CFU)
- 4 in-person practical sessions, each lasting 3 hours. According to the regulations, attendance at at least two-thirds of the practical session hours is required to be eligible to take the exam.

Textbook and teaching resource

The lectures and some suggested readings will be provided by the teacher.

Useful reference texts:

- Marine Conservation Paleobiology; Tyler, C. L., Schneider, C. L., Eds.; Springer: Cham, Switzerland, 2018. https://doi.org/10.1007/978-3-319-73795-9.
- Conservation Palaeobiology of Marine Ecosystems; Nawrot, R., Dominici, S. A., Tomasovych, A., Zuschin, M., Eds.; The Geological Society: London, 2023.

Semester

First semester

Assessment method

The assessment method consists of an oral exam designed to evaluate students' knowledge and understanding of the concepts covered in class and their ability to apply the skills acquired through the development of an original project in Conservation Paleobiology, as well as to assess their knowledge of specific terminology and their ability to communicate effectively.

The oral exam consists of:
A) an oral presentation, given in small groups, of the project developed during the seminars (max 20') and a discussion of the presented project. The exam assesses the student's ability to apply the acquired knowledge appropriately to an original case study specifically developed for this purpose, evaluating their independent judgment and communication skills using appropriate terminology.
B) at least one question, asked individually to each candidate, aimed at assessing their knowledge of the subject concepts explained during lectures.

Grades are expressed as n/30. The minimum passing grade is 18/30.
The final evaluation is on a scale of 30 and will be based on the following criteria:
D1 - Knowledge and comprehension
D2 - Ability to apply knowledge and understanding
D3 - Independent judgment
D4 - Communication skills
D5 - Learning ability

Grade < 18

D1: The student demonstrates fragmented theoretical knowledge.
D2: The student is unable to integrate knowledge into a comprehensive analysis of the case study presented in the final project.
D3: The student processes information inaccurately and incompletely and does not analyze concepts critically.
D4: In the oral presentation and the open-ended question, the student does not use appropriate language and communicates unclearly and
ineffectively.
D5: The student does not demonstrate awareness of their own learning process and fails to make essential connections.

Grade 18–22
D1: The student demonstrates fairly comprehensive theoretical knowledge but with some inaccuracies.
D2: The student integrates this knowledge into a comprehensive analysis of the case study presented in the final project.
D3: The student is able to discuss concepts critically but at a basic level and with inaccuracies.
D4: In the oral presentation and the open-ended question, the student uses appropriate language, albeit with some inaccuracies, and communicates
fairly clearly.
D5: The student demonstrates a basic awareness of their own learning process and is able to make some essential connections.

Grade 23–27
D1: The student demonstrates comprehensive and in-depth theoretical knowledge.
D2: The student satisfactorily integrates this knowledge into a comprehensive analysis of the case study presented in the final project.
D3: The student is able to discuss concepts critically and coherently, demonstrating good analysis of the information.
D4: In the oral presentation and the open-ended question, the student demonstrates good command of language and communicates clearly and
effectively.
D5: The student demonstrates good awareness of their own learning process and is able to highlight the connections between the various cases analyzed.

Grade 28–30
D1: The student demonstrates comprehensive, in-depth theoretical knowledge presented in a rigorous manner.
D2: The student demonstrates an advanced ability to integrate knowledge into a comprehensive analysis of the case study presented in the final project.
D3: The student is able to argue concepts critically and coherently, presenting information in a solid and articulate manner with a well-structured logical flow.
D4: In the oral presentation and the open-ended question, the student demonstrates excellent command of language and communicates clearly and
effectively.
D5: The student demonstrates an advanced awareness of their own learning process and effectively, coherently, and rigorously connects the various cases analyzed.

Exam Dates:
February 3, 2027, 2:30 PM
February 18, 2027, 9 AM
April 1, 2027, 9 AM

Office hours

Please contact me for an appointment: valentina.bracchi@unimib.it

Sustainable Development Goals

QUALITY EDUCATION | CLIMATE ACTION | LIFE BELOW WATER