UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Applied Micropaleontology and Biomonitoring

2526-1-F7504Q008

Aims

To provide rationale and methods for the use of microfossils to reconstruct recent environmental changes in marine coastal and open ocean areas, on the basis of the interplay between natural change and history of the anthropogenic impact. To provide the taxonomic bases for the identification of microfossils and for their application to monitor the status of the marine environment.
In terms of knowledge, the course will provide understanding of marine microorganisms, their environmental significance, and their distribution (DD1). The teachings and the laboratory activities will allow the students to use the distribution and abundance of several key taxa of marine microorganisms to assess the conditions of modern and past environments and provide institutional stakeholders with useful information on the evolution of marine environments and insights into possible cost-effective remediation strategies (DD2).
The laboratory work will strengthen the students' skills in teamwork; the preparation of the laboratory report will improve the students' critical thinking and assessment capacities (DD3); the interactive classes will strengthen the students' ability to study and analyze data autonomously (DD5); the final presentation will improve their communication skills (DD4).

Contents

How to sample, treat and identify planktic and benthic microfossils from different oceanographic contexts and how to apply them for understanding the recent past and for monitoring present-day conditions.

Detailed program

Plankton Module
Lectures

Bases of biogeography. Ecological factors driving the distribution of planktonic organisms in the present and in the recent past. Examples of their application for the reconstruction of the recent environmental evolution of different marine contexts.
Microfossils as monitoring tools: case studies from oceanic (settings calcareous nannoplankton, diatoms silicoflagellates, planktonic foraminifera and pteropods to trace temperature and productivity changes; planktonic carbonate shells as proxy for ocean acidification) and analysis of time-series.
Practical Classes
Practical work under the microscope (reflected and transmitted light microscope; scanning electron microscope), with the aim of identifying microfossils from: sediment sequences from the recent past, present-day bottom sediments, sediment traps, water samples.

Benthos Module
Lectures
Biogeography and distribution of benthic foraminifera in the present and in the past. Ecological factors driving the distribution of marine shelled benthic organisms and examples of their application for the reconstruction of the recent environmental evolution of different marine contexts. Benthic microfossils as monitoring tools in coastal settings (e.g.: benthic foraminifera to assess water quality and environmental status; invasive benthic foraminifera species to trace recent climate change).
Practical Classes
Practical work under the microscope (reflected light microscope), with the aim of identifying microfossils from sediment sequences from the recent past and present-day bottom sediments.

Prerequisites

Paleontology, Geobiology are recommended

Teaching form

All classes will be in English

Plankton Module

- 7 two-hour lectures, in person (1 CFU), of which: 4 two-hours lectures performed as Delivered didactics (8 hours); 3 two-hour classes initially as Delivered Didactics, then actively involving students through Interactive Teaching (6 hours)
- 4 three-hours practical classes, in person, Interactive Teaching (12 hours, 1 cfu).

Benthos Module

- 7 two-hour lectures, in person (1 CFU), of which: 4 two-hours lectures performed as Delivered didactics (8 hours); 3 two-hour classes initially as Delivered Didactics, then actively involving students through Interactive Teaching (6 hours)
  4 three-hour practical classes, in person, Interactive Teaching (12 hours, 1 cfu).

Textbook and teaching resource

Slides and scientific papers provided by the Lecturers on the e-learning page

Semester

Second semester

Assessment method

- Two written reports (plankton module and benthos module) on the lab activities. The reports will contain a synthesis of the laboratory notes, observations, exercises done during the practicals and the interpretation of the obtained data. Objects of the evaluation are: the completeness of the report in relation to the proposed activities, the capacity to synthesize and discuss the analyzed data and the ability to use an appropriate language.
- Group presentation. The results of the data collected during the laboratory activities will be the subject of a presentation made by the students as a team. Objects of the evaluation are: the students' understanding of micropaleontological methods, their capacity to work in a team, their use of an appropriate language and their communication skills.
- Oral examination. Two open questions on the themes explained in the two modules. Object of the evaluation: the acquired knowledge and the acquired capacities in terms of appropriate language and mastery of the themes.

The two reports will count collectively for 1/3 of the final grade, the oral examination will count for 2/3 of the final grade. The project (group) will be evaluated during the oral presentation scheduled during the last lesson of the class and will contribute up to 3 points of the total grade.

Grading in /30

Office hours

Upon appointment by e-mail to the professors

Sustainable Development Goals

QUALITY EDUCATION | LIFE BELOW WATER