UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Ocean Monitoring and Data Analysis

2526-2-F7502Q042

Aims

Knowledge and understanding:
Inform students about available oceanographic databases and how data are collected and stored. Provide information on data processing and statistical analysis techniques.

Ability to apply knowledge and understanding:
Develop the ability to visualize and analyze oceanographic data to answer specific questions, using statistical methods and models, using Python and Jupyter Notebook software.

Contents

Ocean observing systems, including remote sensing, Eulerian stations, drifters and ship measurements. Ocean databases. Spatio-temporal data analysis. Modeling tools. Visualisation tools.

Detailed program

Data retrieved from satellites: sea surface temperature, sea surface salinity, sea surface height, surface wind speed, significant wave height, ocean color.

ARGO floats: subsurface measurements. Moorings and buoys. High Frequency coastal radar network. Reanalysis.

Seasonal variations, removal of seasonal cycle, data detrending and filtering.

Correlation and covariance. Composites.

Statistical significance.

Netcdf data format. TEOS-10 software for seawater properties.

Examples of practical data analysis such as:

Geostrophic currents from hydrographic measurements and from sea surface height.

Tropical cyclone tracks and cold wakes.

Coral bleaching heat stress monitoring: Degree Heating Weeks and coral hotspots.

Prerequisites

Physics of the Sea

Teaching form

a) 2 two-hour lectures and 1 three-hour lecture, Delivered Didactics, remotely.

b) 15 four-hour computer lab activities, in person, initially as Delivered Didactics, then actively involving students through Interactive Teaching.

Textbook and teaching resource

Slides, booklet, and scripts from the instructors.

Semester

First

Assessment method

- Written examination: short report on an individual ocean data analysis project (6 pages upper limit)
- Oral examination: discussion of topics covered during class and of the individual data analysis project

The following will be evaluated: clarity in the presentation, ability to analyze oceanographic data in a critical way, interpretation of results, understanding and mastering of statistical concepts and tests for the analysis.

Office hours

Contact the instructor

Sustainable Development Goals

QUALITY EDUCATION