UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Monte Carlo Approach to Geophysical Inverse Problem: An Introduction

2627-1-124R051

Titolo

Monte Carlo Approach to Scientific Data Analysis: An Introduction

Docente(i)

Nicola Piana Agostinetti

Lingua

English

Breve descrizione

The module presents Monte Carlo (MC) algorithms as tools for the solution of a number of geophysical inverse problems. The module covers an introduction on inverse problem theory and basic concepts about Monte Carlo approach. Three MC algorithms will be presented to solve: (a) a fixed dimension inverse problem; (b) a trans-dimensional inverse problem and (c) an inverse problem using a "Hierarchical Bayes" approach. Algorithms presentation will put emphasis on the fundamental phases of the analysis of the inverse problem and the development of the MC algorithm. Students will be actively involved in the course, encouraged to present their own

inverse problems with the aim of stimulating discussion about possible MC algorithms for their solution. A laptop running PYTHON (and, possibly, a FORTRAN compiler together with GMT, https://www.generic-mapping-tools.org/) is recommended, but all workflows and codes can be tested on the laboratory computers. Examples of the PhD courses can be found here (more related to geophysical sphere): https://gitlab.com/npa-jnotebooks/phd-course-repo

Evaluation: YES (The final test consists in a max 4-pages report on a Student project)

CFU / Ore

2 CFU - 20 Hours (8h lecture - 12h laboratory training)

Periodo di erogazione

Mid-March 2026: four half-days (9-12 or 14-17) between 9th and 20th. Exact dates will be defined with enroled students

Sustainable Development Goals