UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Extreme Events

2223-1-F7501Q102-F7501Q111M

Aims

The overall goal of the teaching module "Extreme Events" is to provide the cultural bases for understanding the climate drivers of extreme events and their impacts on natural and anthropic systems, as well as possible adaptations, through practical sessions, frontal lessons, and a dedictaed lab.

Contents

The discussion will focus on the following themes:
• Definition and features of extreme events (meteorological and climatological aspects)
• Analytical methods for extreme events and their variability
• Analysis of extreme events in the past and future evolution (past-to-future)
• Analysis of the impacts of extreme events on several natural and anthropic systems
• Adaptation to extreme events
• Handling and analysis of data for spatial models

Detailed program

The practical sessions will show the use climate data and digital models within an integrated GIS environment, with the goal of:
• Understanding, organizing and digitizing climate data (e.g. from a meteorological station)
• Learning the bases of Terrain Analysis with the objective to understand the possible effects of extreme events on the territory

The frontal classes will be organized in three main sections:

• An introduction, aiming at (1) providing a general picture of the climate system and (2) climate and meteorological variability, (3) contextualizing the role and methods of scientific research on climate within the international debate and treaties on climate change, and (4) reviewing the main cocepts of descriptive statistics
• A section focussed on key aspects of the module, incluing (1) the scentific bases of climate change, (2) climatic drivers of extreme events and their impacts, and the concepts of vulnerability, risk, adaptation, (3) future scenarios, and (4) climate impacts at the regional scale
• A section (drawing especially from the IPCC reports) dealing with the analysis of climatic drivers of extreme evenets and their impacts (past, emerging, possible/future), the associated risks and possible adaptation strategies, with focus on different types of impacts, different sectors and landscape / environamnetl contexts, inclunding the analysis of compund impacts.

The lab is organized in two main sections, dedicated to:
• Learning the main methods to display and analyze meteo-climatic data (time series, periodicities, probability distributions) at different levels of time resolution, and apply the main tools of descriptive statistics (including measures of dispersion of the data)
• Solving simple problems that show the variablity of extreme events on relation to climate change

Prerequisites

Bases of digital cartography and physical geography

Teaching form

Practical (2 CFU ; Dr. Bosino)
Frontal lessons (3 CFU ; Prof. Albani)
Lab (1 CFU ; Prof. Albani)

Textbook and teaching resource

Teachers' slides, links to publications and relevant web pages (e.g. https://www.ipcc.ch/)

Semester

Practical (**FIRST semester** ; Dr. Bosino)
Frontal lessons (**SECOND semester** ; Prof. Albani)
Lab (**SECOND semester** ; Prof. Albani)

Assessment method

Oral exam of the topics presented during the frontal classes and the lab. The practical sessions will be evaluated

through a dedicated practical activity, yielding a bonus/malus ranging between -3/30 to +3/30 on the final score of the oral exam.
Intermediate evaluation steps are foreseen (and strongly recommended), concerning both the practical sessions part (dedicated practical activity) as well as the theory+lab part (exericses, multiple choice, open questions), and will be carried on during the last lesson of each part. The oral exam is **not** required for students with a sufficient score on the intermediate test for the theory+lab part.
The final score will be registred after enrolling to the entire course "Sustainable Management of the Territory", resulting from the average of the scores of the two modules "Environmental Geology and Territorial Management" and "Extreme Events".

Office hours

By appointment

Sustainable Development Goals

CLIMATE ACTION