SYLLABUS DEL CORSO

Eventi Estremi

2425-1-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 frontal classes will be organized in three main sections:
• An introduction, aiming at providing a general picture of the climate system and climate and meteorological variability (including a definition of extreme events), and contextualizing the role and methods of scientific research on climate within the international debate and treaties on climate change
• A section focussed on key aspects of the module, incling the scentific bases of climate change, climatic drivers of extreme events and their impacts, and the concepts of vulnerability, risk, adaptation, future scenarios, and climate impacts at the regional scale

• A section (drawing especially from the IPCC reports and selected technical documents) 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 aims at:
• 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)
• Clarifying different definitions of extreme events, based on the statistical methods previously recalled, applied to meteo-climatic data
• Solving simple problems that show the variablity of extreme events on relation to climate change

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

Prerequisites

Bases of digital cartography and physical geography

Teaching form

12 two-hour lectures of delivered didactics, in person (3 CFU ; Prof. Albani)
5 two-hours laboratory, LiBaaS, sessions of interactive teaching, in person (1 CFU ; Prof. Albani) - compulsory presence to at least 75% of the hours
5 four-hours practical classes (LiBaaS) with interactive teaching (2 CFU ; Dr. Bosino) - compulsory presence to at least 75% of the hours

Textbook and teaching resource

Teachers' slides, scientific and techincal documets (see list below), further in-depth reading (links to relevant scientific publications, documents, web pages).

General parts (bases of climatology)
• Atmospheric science : an introductory survey, J.M. Wallace and P.V. Hobbs, Elsevier, 2006.
• Global Physical Climatology, D.L. Hartmann, Academic Press, 1994 (eBook).
• A Climate Modelling Primer. Kendal McGuffie; Ann Henderson-Sellers. Edition: 3rd ed. Chichester, West Sussex : Wiley. 2005. eBook.

Specific parts (climate change, extreme events, impacts, adaptation)
• IPCC Assessment Report 6, Working Group 1. Technical Summary : https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_TS.pdf
• IPCC Assessment Report 6, Working Group 2. Technical Summary :

https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_TechnicalSummary.pdf
• Summary documents in Italian available through the IPCC Focal Point for Italy : https://ipccitalia.cmcc.it/
• Additional specific documents will be made available during the course.

Semester

Frontal lessons (**SECOND semester** ; Prof. Albani)
Lab (**SECOND semester** ; Prof. Albani) - compulsory presence to at least 75% of the hours
Practical (**SECOND semester** ; Dr. Bosino) - compulsory presence to at least 75% of the hours

Assessment method

Lectures and laboratory sessions will be evaluated through an oral exam on the topics of the course. *The last two-hours laboratory session, that is not compulsory, will be held as in person interactive teaching in the form of a written test that the teacher will evaluate in the following days; it is to be understood as a form of students' preliminary auto-evaluation of their preparation. However, in case of a positive evaluation of the written test, students can chose to accept that score as the final evaluation, without the need to take the oral exam.*

The practical sessions will be evaluated through a dedicated practical activity.

The final score for module "Extreme Events", on a scale of 30 points, will result from the weighted average of the scores of "Lectures and laboratory sessions" (4) and "Practical activities" (2).

As per the University rules, presence limited to less than 75% of the hours dedicated to each of the practical and lab activity sessions precludes the access to the final exam.

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