SUBJECT TEACHING GUIDE

M1980 - THE ENVIRONMENT AND METEOROLOGY

University Master's Degree in Data Science

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	University Master's Degree in Data Science			Type and Year	Optional. Year 1
Faculty	Faculty of Sciences				
Discipline	DATA LABORATORIES				
Course unit title and code	M1980 - THE ENVIRONMENT AND METEOROLOGY				
Number of ECTS credits allocated	3	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICA APLICADA Y CIENCIAS DE LA COMPUTACION
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Other lecturers	SIXTO HERRERA GARCIA

3.1 LEARNING OUTCOMES

- Knowledge of the main current data portals and repositories, and the tools and software used to analyze and work with climate data.
- Learn how to apply machine learning and data mining techniques to climate analysis, including the current main problems addressed in this research field (e.g. climate change, downscaling, climate impacts etc.)

4. OBJECTIVES

The data laboratories (DataLabs) are aimed at enabling the student to learn from experts in different areas of knowledge (physics, medicine, genetics, environmental science, biodiversity, economy, social networks, etc.) the techniques and most relevant data sets in the Open Science scene.
In particular, the Meteorology and Environment DataLab will focus on modern climate science focusing on data mining and machine learning techniques, addressing the problems of climate data analysis and statistical downscaling of future climate projections, building upon open-source tools in a big data context, as well as the analysis of climate impacts on different environmental contexts (sectoral climate indicators, wildfires, droughts etc.).

6. COURSE ORGANIZATION

CONTENTS	
1	Basic concepts. Introduction to climate science and climate and environmental databases.
2	Standards in Meteorology and Environment data storage and processing.
3	Practical examples of commonly addressed problems in Meteorology and Environment. Machine learning and data mining applications. Downscaling of global climate model outputs.
4	Climate Model Evaluation

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Assessment of the practical session reports	Activity evaluation with Virtual Media	Yes	Yes	60,00
Assessment of an oral presentation of a practical application	Work	Yes	Yes	40,00
Practical Lab sessions	Laboratory evaluation	No	No	0,00
TOTAL				100,00

Observations

If the student's final grade is less than 5 out of 10, then the recovery will consist of completing each of the tasks in which she / he had obtained a grade lower than 5. The criteria for evaluation of a recoverable activity will be equivalent to those for the original activity.

Observations for part-time students

Attendance is required, so the same assessment will be applied as for full-time students, taking into account their special circumstances in terms of deadlines for the assignments.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

J.M. Gutiérrez, R. Cano, A.S. Cofiño, and C. Sordo (2004) Redes Probabilísticas y Neuronales en las Ciencias Atmosféricas. Monografías del Instituto Nacional de Meteorología, Ministerio de Medio Ambiente, Madrid. ISBN: 84-8320-281-6. URL: https://grupos.unican.es/ai/meteo/articulos/LibroINMComprimido.pdf

Iturbide, M., Bedia, J., Herrera, S., Baño-Medina, J., Fernández, J., Frías, M.D., Manzanas, R., San-Martín, D., Cimadevilla, E., Cofiño, A.S., Gutiérrez, J.M., 2019. The R-based climate4R open framework for reproducible climate data access and post-processing. Environmental Modelling & Software 111, 42–54. https://doi.org/10.1016/j.envsoft.2018.09.009