SUBJECT TEACHING GUIDE

335 - Functional Data Statistical Analysis

Master's Degree in Mathematics and Computing

Academic year 2023-2024

1. IDENTIFYING DATA				
Degree	Master's Degree in Mathematics and Computing		Type and Year	Optional. Year 1
Faculty	Faculty of Sciences			
Discipline	STATISTICS			
Course unit title and code	335 - Functional Data Statistical Analysis			
Number of ECTS credits allocated	3	Term	Semester based (2)	
Web				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION
Name of lecturer	JUAN ANTONIO CUESTA ALBERTOS
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Other lecturers	

3.1 LEARNING OUTCOMES

- To understand the usefulness of treating certain data as functions and learn how to adapt the different techniques for general data analysis to be applied to this kind of data

4. OBJECTIVES

Nowadays, there are many data that are acquired on a continuous basis (evolution of stock market prices, vital signs of patients, data from manufacturing processes, etc.) and which are therefore realisations of functions measured over time intervals. The aim is to understand the basic problems involved in handling this type of functions and to learn the statistical techniques available for their analysis.

6. COURSE ORGANIZATION

	CONTENTS
1	Description and basic techniques to handle functional data
2	Parameter estimation
3	Supervised and un-supervised learning with functional data
4	Regression problems with functional data Functional linear model and associated tests of hypotheses.
5	Complements

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
It would be realized along the course.	Work	No	No	40,00
It would consist of the analysis of some data sets and/or the solution of theoretical questions	Written exam	No	Yes	60,00
TOTAL				100,00
Observations				
Observations for part-time students				
Part-time students must indicate whether they opt for continuous assessment or only the final assessment which, in this case, will be 100% of their grade.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
Nonparametric functional data analysis : theory and practice / Frédéric Ferraty, Philippe Vieu. Editorial: New York : Springer, cop. 2006. ISBN: 978-0-387-30369-7
Applied functional data analysis : methods and case studies / J. O. Ramsay, B. W. Silverman. Editorial: New York : Springer, cop. 2002. ISBN: 0-387-95414-7
Functional data analysis / J. O. Ramsay, B. W. Silverman. Editorial: New York : Springer, cop. 2005. ISBN: 978-0387-40080-8
Functional data analysis with R and MATLAB / J. O. Ramsay, Giles Hooker, Spencer Graves. Editorial: London : Springer, cop. 2009. ISBN: 978-0-387-98184-0
A partial overview of the theory of statistics with functional data / Antonio Cuevas Journal of Statistical Planning and Inference Vol. 147 (2014); pags. 1–23