SUBJECT TEACHING GUIDE

G109 - Extensive Stadistics

Double Degree in Physics and Mathematics
Degree in Mathematics

Academic year 2026 - 2027

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Mathematics			Type and Year	Optional. Year 5 Optional. Year 4
Faculty	Faculty of Sciences				
Discipline	Subject Area: Further Probability and Statistics Mention in Pure and Applied Mathematics				
Course unit title and code	G109 - Extensive Stadistics				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION
Name of lecturer	ALICIA NIETO REYES
E-mail	alicia.nieto@unican.es
Office	Facultad de Ciencias. Planta: + 1. DESPACHO (1036)
Other lecturers	MIGUEL MARTINEZ ANTON

3.1 LEARNING OUTCOMES

The students should understand the main problems of Multivariate Statistics, with special emphasis on classification techniques (Supervised Automatic Learning), and handle the associated statistical techniques. An introduction to the multidimensional normal distribution is also included.

The basic principles of the Game and Decission Theory and the Bayesian Statistics will also be presented.

4. OBJECTIVES

The course has two well-defined parts. The first is more theoretical: it includes the analysis of the multivariate normal distribution. The second s more practical and focuses on solving the most common problems of Multivariate Statistics.

6. COURSE ORGANIZATION	
CONTENTS	
1	MULTIVARIATE STATISTICS. Introduction. Principal Component Analysis. Factorial analisys. Cluster analysis. Multidimensional Scaling. Discriminant Analysis (Automatic Supervised Learning)
2	MULTIDIMENSIONAL NORMAL DISTRIBUTION Characterization. Characteristic and density function. Cramer-Wold theorem. Multidimensional Central Limit Theorem

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessment	%
It will be based on the work of the student in class.	Others	No	Yes	40,00
The final evaluation is an exam. If the students agree, and teh size of the group allows for it, it will be substituted by projects.	Work	Yes	Yes	60,00
TOTAL				100,00
Observations				
Observations for part-time students				
The evaluation of part-time students will follow the same rules as regular students.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
CUESTA ALBERTOS, J.A. Análisis Multivariante. Universidad de Cantabria, 2021. FERGUSON, T.S. Mathematical Statistics. Academic Press, 1967. LINDGREN, B.W. Statistical Theory. Mc. Millan, 1968. MANLY, B. Multivariate Statistical Methods. Chapman and Hall, 1986. RAO, C.R. Linear Statistical Inference and its Applications. Wiley, 1973. WILLIAMS, D. Weighing the Odds : A Course in Probability and Statistics. Cambridge University Press, 2001.