SUBJECT TEACHING GUIDE

G824 - Mathematical Methods for Telecommunications

Degree in Telecommunication Technologies Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Telecommunication Technologies Engineering			Type and Year	Compulsory. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Mathematical Methods for Telecommunications Compulsory Module				
Course unit title and code	G824 - Mathematical Methods for Telecommunications				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web	http://gtas.unican.es/docencia/mmt				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA DE COMUNICACIONES
Name of lecturer	JESUS MARIA IBAÑEZ DIAZ
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Other lecturers	JESUS PEREZ ARRIAGA DIEGO CUEVAS FERNANDEZ

3.1 LEARNING OUTCOMES
- Formulation of problems from a statistical point of view
- Solution of problems related to random experiments
- Application of random variables, correlation and independence concepts to practical problems
- Statistical characterization of random variables
- Introduction to estimation, detection, and classification problems
- Matlab simulation of random experiments
- Identification of convex optimization problems
- Solution of optimization problems with Matlab

4. OBJECTIVES
Review of basic probability theory and introduction of random variable, correlation, and independence concepts
Knowledge of tools and principles of statistical signal processing
Matlab simulation of random experiments
Solution of optimization problems with Matlab

6. COURSE ORGANIZATION	
CONTENTS	
1	Probability Theory
2	Unidimensional Random Variables
3	Function of a Random Variable and Asymptotic Theorems
4	Multidimensional Random Variables
5	Estimation of a Random Variable
6	Random experiments and optimization problems using Matlab: Unconstrained Optimization . Constrained Optimization. KKT conditions. Linear Programing. Integer Programing

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Final Exam	Written exam	Yes	Yes	55,00
Follow-up tests	Written exam	No	Yes	20,00
Evaluation of the Laboratory	Laboratory evaluation	No	No	25,00
Extraordinary examination	Written exam	Yes	No	0,00
TOTAL				100,00

Observations

The final course grade is calculated by the following expression:

Final note = max [(60 FE + 20 LP + 20 FU) / 100 (80 FE + 20 LP) / 100]

where:

FE = Final Examination grade; LP = Laboratory Practice grades; FU = Follow-up tests grades

Observations for part-time students

Part-time students can take the final exam and/or the second-chance exam with a 75% weight. The 25% of the final qualification corresponds to the laboratory evaluation.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

P. Z. Peebles Jr., Probability, Random Variables and Random Signal Principles, cuarta edición, McGraw-Hill, 2001.

A. Papoulis, Probability, Random Variables and Stochastic Processes, cuarta edición, McGraw-Hill, 2002.

H. Stark, J. W. Woods, Probability, Random Processes, and Estimation Theory for Engineers, 2ª edición, Prentice Hall, 1994.