SUBJECT TEACHING GUIDE

G1491 - Signal Processing in Wireless Communications

Degree in Telecommunication Technologies Engineering

Academic year 2023-2024

1. IDENTIFYING DATA				
Degree	Degree in Telecommunication Technologies Engineering		Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications			
Discipline	Speciality Optional Subjects			
Course unit title and code	G1491 - Signal Processing in Wireless Communications			
Number of ECTS credits allocated	6	Term	Semester based (2)	
Web	http://gtas.unican.es/docencia/psci			
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA DE COMUNICACIONES
Name of lecturer	JAVIER VIA RODRIGUEZ
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Other lecturers	

3.1 LEARNING OUTCOMES
- The student knows how to characterize the performance of both single-carrier and multicarrier digital communications systems by means of Monte Carlo simulations
- The student knows the main characteristics of the PHY-layer of wireless communication standards.
- The studet knows the main signal processing stages of any wireless communications system, as well as the algorithms used.
- The student will be able to apply digital signal processing algorithms to multiple-input multiple-output (MIMO) systems.

4. OBJECTIVES

To understand the main blocks of single-carrier and multicarrier digital communications receivers.
To know the PHY-layer parameters of the main wireless communications standards.
To characterize the performance of wireless communication systems by means of simulations.
To introduce MIMO systems and know their impact on modern wireless communication systems.

6. COURSE ORGANIZATION

	CONTENTS
1	Basic concepts on Software Defined Radio (SDR). Single-carrier and multicarrier systems (OFDM): transmitter, channel and receiver blocks. Synchronism. Channel estimation and equalization. Channel coding.
2	Block diagram of MIMO systems (channel models, transmitter and receiver blocks). Diversity and multiplexing gain. Detection in MIMO systems. Space-Time Block Coding (STBC). Orthogonal codes. Alamouti code. MIMO systems in modern wireless standards.
3	Spectrum sensing techniques for Cognitive Radio. Cognitive Radio concept. The spectrum sensing problem. Review of detection problems. Energy detector. Multiantenna detectors. Cyclostationarity-based detectors. Performance evaluation.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Homework Assignments	Work	No	Yes	100,00
TOTAL				100,00
Observations				
The evaluation process could be done in remote In case of a new sanitary alert.				
Observations for part-time students				
Part-Time Student Evaluation is Based on the HomeWork Assignments				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
Apuntes de la asignatura
D. Tse, P. Viswanath, Fundamentals of Wireless Communications, Cambridge University Press, 2005
Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2005