

## SUBJECT TEACHING GUIDE

G1491 - Signal Processing in Wireless Communications

Degree in Telecommunication Technologies Engineering

Academic year 2021-2022

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	<a href="http://gtas.unican.es/docencia/psci">http://gtas.unican.es/docencia/psci</a>				
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 student 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				
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