

SUBJECT TEACHING GUIDE

G840 - Mobile and 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	Subject Area: Telecommunications Systems		
Course unit title and code	G840 - Mobile and Wireless Communications		
Number of ECTS credits allocated	6	Term	Semester based (1)
Web			
Language of instruction	Spanish	English Friendly	Yes
		Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA DE COMUNICACIONES
Name of lecturer	JESUS RAMON PEREZ LOPEZ
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Other lecturers	

3.1 LEARNING OUTCOMES

- The student identifies the mobile communications systems according to their technical evolution, frequency bands, characteristics of the radio interface, architecture, principles of operation and offered services. Understanding mobile communications systems such as GSM, UMTS, LTE, LTE-Advanced.
- Measures and plans cellular mobile systems including traffic analysis and channels assignment.
- Carries out radio link budgets and capacity calculations. Competences to analyze the link budget in GSM, UMTS and LTE systems.
- Handles software tools and plans wireless networks including channels assignment as well as interferences analysis. Characterizes the propagation in both indoor and outdoor scenarios.

4. OBJECTIVES

Introduce basic concepts concerning cellular systems and apply them to the planning and sizing of mobile communications systems according to the traffic and the radio spectrum.

Know the evolution of mobile communications systems, their standards and the regulatory bodies.

Present and analyze the main characteristics concerning 2G, 3G and 4G mobile systems, their architecture and services. Go in depth with GSM, UMTS and LTE radio link budget, coverages and capacity.

Plan mobile communications systems in both indoor and outdoor scenarios. Use some tools to characterize the radio channel as well as to size and plan wireless networks from the coverage and capacity point of view.

6. COURSE ORGANIZATION

CONTENTS

1	<p>BLOCK 1. (Units 1-4)</p> <p>Evolution of mobile communications systems. Frequency bands and services. Regulatory bodies. Elements of a mobile communications system. Multiple access methods. Modulation techniques. The radio channel. Private mobile radio systems, TETRA. Cellular systems: characteristics, cellular geometry, frequency reuse, interferences and sizing.</p>
2	<p>BLOCK 2. (Units 5-8)</p> <p>The GSM system: specifications, architecture, the radio interface, mobility, link budget and sizing. The UMTS system: WCDMA, architecture, the UTRA radio interface, cell breathing, capacity. The LTE system: architecture, frequency bands, OFDMA, radio resources scheduling and link budget. The 5G systems: challenges, frequency bands and radio access enhancements.</p>
3	<p>BLOCK 3. (Unit 9)</p> <p>Wireless local area networks: characteristics, types and standards. Channels in WLAN, modulations and interferences. Security in wireless networks. Planning.</p>

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Laboratory sessions	Laboratory evaluation	No	No	10,00
Exam, Block 1	Written exam	No	Yes	40,00
Exam, Blocks 2 and 3	Written exam	No	Yes	50,00
TOTAL				100,00
Observations				
<p>There are two ways of evaluation, a continuous evaluation during the four-month period according to the previous description outlined, or a final exam.</p> <p>Regarding to the continuous evaluation and concerning any of the two exams proposed, if either the minimum mark is not achieved (3.0) or in case an alternative evaluation is desired, it should be taken the final exam, representing the 90% of the final mark. The remainig 10% is associated with the lab practices mark.</p> <p>The extraordinary exam will take 90% of the final mark. The remainig 10% is associated with the lab practices mark.</p>				
Observations for part-time students				
The statements mentioned above for full-time students are applicable for those partial-time.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

J.M. Hernando Rábanos. Comunicaciones Móviles. Editorial Universitaria Ramón Areces, Tercera Edición, 2015.
E. Dahlman, S. Parkvall, J. Sköld, 4G LTE / LTE-Advanced for Mobile Broadband. Academic Press, 2nd Edition, 2014.
M.S. Gast. 802.11 Wireless Networks: The Definitive Guide. O'Reilly, 2nd Edition, 2006.