SUBJECT TEACHING GUIDE

G848 - Wireless Networks

Degree in Telecommunication Technologies Engineering

Academic year 2021-2022

1. IDENTIFYING DATA					
Degree	Degree in Telecommunication Technologies Engineering			Type and Year	Optional. Year 3
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Communications Network Architecture				
Course unit title and code	G848 - Wireless Networks				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web	https://www.tlmat.unican.es/index.php?l=es&p=teaching&s=subjects&ss=g_ri&				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA DE COMUNICACIONES
Name of lecturer	LUIS MUÑOZ GUTIERREZ
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Other lecturers	MARTA GARCIA ARRANZ LUIS FRANCISCO DIEZ FERNANDEZ

3.1 LEARNING OUTCOMES

- The student will be able to understand and predict the main consequences linked to the radio propagation channel. The performance of digital cellular systems will be evaluated according to the network architecture design. With this background the student will be able to conceive and design future cellular networks based on the requirements imposed by both the users and the services.

4. OBJECTIVES

The following objectives are addressed:
1) The radio channel and its limitations.
2) Analysis of the efficiency of radio resource sharing techniques in wireless networks .
3) Cellular access networks capacity analysis.
4) Understanding the concept of logical channel and its mapping onto physical resources.
5) To apply the above concepts to GSM and GPRS systems.
6) Analysis of cellular systems based on CDMA techniques.
7) CDMA techniques as the basis for 3G and 3,5G.
8) To understand the needs, limitations and possibilities of short range wireless communications.
9) The IEEE 802.11x familly: Standards and evolution.

6. COURSE ORGANIZATION

CONTENTS	
1	Introduction to mobile communication systems. Basic concepts on propagation. Flat-earth model. Fading. Radio engineering techniques. Radio resource sharing techniques. The concept of cellular system. Capacity of cellular systems. Fundamentals of cellular network planning.
2	The GSM system. Requirements for a global cellular digital system. Initial proposal. GSM architecture. Constitutive modules and functionalities. The radio interface. Bursts. The GSM logical channel concept. Mapping logical channels onto physical resources. Type of combinations. Planning GSM networks. Call establishment and network association.
3	The GPRS system. The need for supporting mobile data. GSM evolution for supporting data services: SGSN and GGSN. The GPRS radio interface.
4	CDMA techniques. Spread spectrum techniques review. Beyond TDMA and TDMA/FDMA schemes. The radio channel and spread spectrum techniques. RAKE receiver. Sharing resources with CDMA. Capacity analysis of CDMA systems. Cell breathing effect.
5	The IMT-2000 system. Evolution from 2G to 3G. Requirements. Standardization: 3GPP and working groups. UMTS architecture. UTRA-FDD. Transport, logical and physical channels. Mapping onto physical resources. The path from 3G to 4G. HSDPA and HSUPA. Introduction to LTE-A.
6	Wireless local area networks. Needs and requirements. The standardization process. Introduction to the IEEE 802.11x physical and MAC layers.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
The subject will be evaluated through a final exam whose mark, FEM, will be weighted (60%) with the continuous evaluation, CEM. In the former, a mark higher than 4 points out of 10 is required to be considered for averaging both of them. The students not	Written exam	No	Yes	40,00
The final exam will cover all the subjects addressed during the semester.	Written exam	Yes	Yes	60,00
TOTAL				100,00

Observations

The subject will be evaluated through a final exam whose mark, FEM, will be weighted (60%) with the continuous evaluation, CEM. In the former, a mark higher than 4 points out of 10 is required to be considered for averaging both of them. The final mark will be the maximum of (FEM; FEM*0.60+CEM*0.40). The students not attending the lectures or deciding not to participate in the continuous evaluation will obtain the mark corresponding to the final exam.
In the case that a COVID-19 triggers a new health alert the exams will be carried out remotely.

Observations for part-time students

The students not attending the lectures or deciding not to participate in the continuous evaluation will obtain the mark corresponding to the final exam.
In the case that a COVID-19 triggers a new health alert the exams will be carried out remotely.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

The GSM System for Mobile Communications; Autores: Michel Mouly, Marie-Bernadette Pautet.
An Introduction to GSM; Autores: Siegmund M. Redl, Matthias K. Weber; Malcolm W. Oliphant; Editorial: Artech House.
GPRS: Gateway to Third Generation Mobile Networks; Autores: Gunnar Heine; Holger Sagkob; Editorial: Artech House.
UMTS: The Fundamentals; Autores: B. Walke; P. Sidenberg; M.P. Althoff; Editorial: John Wiley.