SUBJECT TEACHING GUIDE

G2028 - Fundamentals of Telecommunications

First Degree in Telecommunication Technologies Engineering

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	First Degree in Telecommunication Technologies Engineering			Type and Year	Core. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline					
Course unit title and code	G2028 - Fundamentals of Telecommunications				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Knowledge Field	Electrical engineering, electronic engineering and telecommunications engineering				
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA DE COMUNICACIONES
Name of lecturer	JOSE MARIA ZAMANILLO SAINZ DE LA MAZA
E-mail	jose.zamanillo@unican.es
Office	Edificio Ing. de Telecomunicación Prof. José Luis García García. Planta: - 1. DESPACHO (S138)
Other lecturers	LUIS SANCHEZ GONZALEZ FRANCO ARIEL RAMIREZ TERAN

4. OBJECTIVES

To provide the basic concepts linked to both telecommunications and service infrastructures as well as the most relevant techniques, trends and business models in the short and medium term.

6. SUBJECT PROGRAM	
CONTENTS	
1	A brief history of telecommunications, standardization bodies, and fundamental concepts. 1) Standardization bodies in electronics and telecommunications. 2) Searching for high-quality scientific and technical information using BUC resources. 3) Fundamental concepts in telecommunications. 3.1) Units. 3.2) Time and frequency domains. 4) Current and future trends in telecommunications: 4.1) Artificial intelligence in telecommunications. 4.2) Quantum computing in the future of secure telecommunications.
2	Point-to-point guided communications: Transmission media i) Guided communications: Transmitter and receiver. ii) Fundamentals of electronics and electro-optics systems. Transmission media. i) Type of cables: From the copper wire to the optical fibre cable. ii) Signal levels in the transmission/reception chain. Non-guided communications. i) Radiofrequency subsystem. ii) Broadcasting systems: From the analog radio and TV to the digital ones. iii) Radiolinks. iv) Satellite communication systems: GEO, MEO and LEO. The Starlink constellation. v) Mobile communication systems. vi) Radio link budget.
3	The concept of network and typologies. i) The telephone network. ii) The suscriber loop: The transition from the copper pair to the FTTH. iii) Wide area networks. iv) Personal and local area networks: Standards. Services and business models in telecommunications. i) From the e-mail to the multimedia services. ii) Security in networks and services: Cybersecurity. iii) Network operation and management. iv) Virtual operators. v) An eye to the future: Towards the quantum communications.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Quiz-1	Written exam	No	Yes	30,00
Quiz-2	Written exam	No	Yes	30,00
Quiz-3	Written exam	No	Yes	30,00
Hands-on quiz	Laboratory evaluation	Yes	No	10,00
TOTAL				100,00

Observations

The students suceeding in the three quizzes, they will obtain the average mark of those, including the hands-on lab quiz mark.
For those not participating in the continuous evaluation, they will obtain the mark corresponding to the final exam.

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.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

1) W. Tomasi: Electronic Communications Systems; ISBN-10: 0137514395.
2) J. Butler et al: Wireless Networking in the Developing World; https://wndw.net/
3) Constantino Pérez-Vega, Jose Mª Zamanillo Sainz de la Maza y Alicia Casanueva López. "Sistemas de Telecomunicación". Textos Universitarios. Servicio de Publicaciones de la Universidad de Cantabria, Primera Edición. Julio 2007. ISBN 978-84-8102-454-8