SUBJECT TEACHING GUIDE

G835 - Radiocommunication

Degree in Telecommunication Technologies Engineering
First Degree in Telecommunication Technologies Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Telecommunication Technologies Engineering First Degree in Telecommunication Technologies Engineering			Type and Year	Optional. Year 3 Optional. Year 3
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Transmission and Treatment of Signals				
Course unit title and code	G835 - Radiocommunication				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA DE COMUNICACIONES
Name of lecturer	RAFAEL PEDRO TORRES JIMENEZ
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Other lecturers	

3.1 LEARNING OUTCOMES
- -- Knows the fundamentals, advantages and limitations of radio communication systems.
- -Learn how the radio spectrum is managed and handle the recommendations issued by the organizations regulators
- -Understand and evaluate the impact of noise and interference on radio communication systems
- - Knows and handles the basic parameters of antennas as elements of radio communication systems.
- -Select the appropriate antennas for different radio communication systems
- -Understands the basic propagation mechanisms and uses them to evaluate losses in different bands
- -Understand and evaluate the response of the multipath channel in complex environments
- - It uses the previous results to carry out basic calculations related to the planning of fixed radio links, communication systems, broadcasting and mobile communication systems.

4. OBJECTIVES
Acquire the fundamental knowledge that supports radio communication systems.
Understand the limitations imposed by the radio spectrum, noise and interference.
Know the regulatory agencies of the spectrum at a national and international level.
Acquire the ability to assess the advantages and disadvantages of the use of radio communication systems compared to guided systems.
Acquire the ability to carry out link balances, selecting the appropriate antennas for the system and using the appropriate methods for calculating propagation losses.
Acquire the basic skills necessary to address the planning and sizing of point-to-point fixed radio links.
Acquire basic knowledge and skills for planning mobile systems from the point of view of mobile network coverage.
Understand the limitations to the massive transmission of information imposed by the radio channel, assess and understand the technological challenges that have been and continue to be the continuous improvement of radio communication systems in terms of capacity and quality of service.

6. SUBJECT PROGRAM

CONTENTS	
1	Topic 1.- Introduction Basic definitions and terminology. Natural and logarithmic units. Spectrum management. block structure of a radio communication system.
2	Topic 2.- Fundamentals of radio communication systems Antennas: types, parameters of reception and transmission antennas. Energy model: link balance. noise in radio communication systems. Interference in radio communication systems.
3	Topic 3.- Basic Radiopropagation Mechanisms Propagation in free space. flat earth model. Surface wave propagation. Influence of the troposphere. Curved earth model. diffraction propagation.
4	Topic 4. Propagation in complex environments Spread in urban and indoor environments. Empirical prediction methods: Okumura-Hat, COST 231, etc. Electromagnetic prediction methods: geometric optics and ray tracing.
5	Topic 5.- Multipath channel and its consequences. Temporal dispersion and frequency selectivity. Doppler spread and temporal variability of the channel. The fading and its statistical description. Basic techniques of diversity.
6	Topic 6.- Radio communication systems. Noise limited systems: fixed point-to-point radio links. Systems limited by interference: systems of mobile communications.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Assessment test for topics 1 to 3	Written exam	No	Yes	35,00
Assessment test for topics 4 to 6	Written exam	No	Yes	60,00
The practices are evaluated throughout their realization in the laboratory.	Laboratory evaluation	No	No	5,00
TOTAL				100,00

Observations

A double evaluation path is contemplated, a continuous evaluation system whose final grade will correspond to the weighted result of the three previously described evaluation activities, or a final exam to be carried out on the date set by the center.

In the continuous evaluation, a minimum grade of 4 must be achieved in the two proposed exams. Otherwise, the final exam must be taken.

In the ordinary call and in the extraordinary call, there will be a test of the whole subject that will suppose 95% of the qualification. The remaining 5% will correspond to the qualification obtained in the laboratory practices.

IMPORTANT NOTE: The remote evaluation of these same tests and laboratory practices is foreseen, in the case of a new health alert due to COVID-19, making it impossible to carry out the evaluation in person.

Observations for part-time students

Part-time students will abide by the same rules as full-time students. In the event that students cannot opt ??for continuous assessment, they can always pass the subject in the final exam.

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Antenas. Angel Cardama, Lluís Jofre, Juan Manuel Rius, etc. Edicions UPC. 1998.
José María Hernando Rábanos. Transmisión por radio. Editorial Ramón Areces. Séptima edición. 2013.
José María Hernando Rábanos, Luis Mendo Tomás, José Manuel Riera Salís. Comunicaciones Móviles. Editorial Ramón Areces. Tercera edición. 2015.
Datos de propagación y métodos de predicción necesarios para el diseño de sistemas terrenales con visibilidad directa. Recomendación UIT-R P.530-16 (07/2015)
Métodos de predicción de punto a zona para servicios terrenales en la gama de frecuencias de 30 a 3000 GHz