

## SUBJECT TEACHING GUIDE

### G834 - Guided Transmission Media

#### Degree in Telecommunication Technologies Engineering

Academic year 2023-2024

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: Transmission and Treatment of Signals				
Course unit title and code	G834 - Guided Transmission Media				
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	OSCAR FERNANDEZ FERNANDEZ
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Other lecturers	JUAN LUIS CANO DE DIEGO

### 3.1 LEARNING OUTCOMES

- To know the basic concepts of transmission line theory (circuit model, voltage and current waves, impedance, power, etc ...)
- Understand concepts related to loaded transmission lines (reflection coefficient, standing waves, input impedance, etc ...)
- Understand the behavior of transmission lines in transient state
- Understand the concept of waveguide and the electromagnetic model transmission lines as well as the most important types of guides and transmission lines (rectangular waveguide, coaxial cable, planar lines, etc ...)
- To know the basic microwave circuits, and its main technologies and devices
- To solve transmission line problems by the Smith chart
- Knowing and applying several techniques of impedance matching
- Perform basic laboratory measurements of transmission lines and rectangular waveguides

### 4. OBJECTIVES

The aim of this subject is to present the general theory of waveguides and transmission lines and its application in the field of microwave circuits. It also deals with the resolution of practical problems and the student is introduced to the basic instrumentation and measurement laboratory techniques.

### 6. COURSE ORGANIZATION

#### CONTENTS

1	<p><b>BLOCK 1</b></p> <p>Subject 1. Basic concepts of the transmission line theory. Introduction. Circuitual model of a transmission line. General equations of a transmission line. Solution of the wave equation in the time domain. Solution of the wave equation in the frequency domain. Lines with low losses and without losses. Power.</p> <p>Subject 2. Mismatch transmission lines Introduction. Reflection, Standing waves. Input impedance. Mismatch in the load and generator. Transient Response.</p> <p>Subject 3. Waveguides and transmission lines. Introduction. General solutions for TEM, TE and TM waves. The parallel planes guide. The rectangular guide. The circular wave guide. The coaxial cable. Planar lines.</p>
2	<p><b>BLOCK 2</b></p> <p>Subject 4. Introduction to microwave circuits Introduction. Equivalent voltajes and currents. Impedance and admittance parameters. Scattering parameters</p> <p>Subject 5. Smith Chart Introduction. Smith Chart. Simple calculations. Smith Chart of admittances</p> <p>Subject 6. Impedance matching Introduction. Discrete networks of two elements in L. Simple stub. Double stub. Quarter-wave transformer</p>

### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written exam of problems and issues of block 1	Written exam	No	Yes	42,00
Written exam of problems and issues of block 2	Written exam	No	Yes	42,00
Evaluation of laboratory practices	Laboratory evaluation	No	No	10,00
Activities of continuous evaluation with deliverables	Others	No	No	6,00
Final examination of problems and questions	Written exam	Yes	Yes	0,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>The final evaluation for the course will be calculated by the average score of the obtained partial grades (each block + evaluation of deliverable activities and practices).</p> <p>To carry out this average mark it is necessary that each partial mark has been obtained at least 4 (of a maximum of 10).</p> <p>The aim of the final examination is to recover those written exams that were not passed during the semester.</p> <p>The realization of the practices and deliverable activities is mandatory and they have not recovery.</p>				
<b>Observations for part-time students</b>				
The evaluation of part-time students will be carried out according to the special conditions accredited by each student				

### 8. BIBLIOGRAPHY AND TEACHING MATERIALS

#### BASIC

D. M. Pozar, "Microwave Engineering", 3<sup>a</sup> Ed., Wiley, New Jersey, 2005.  
R. Neri, "Líneas de Transmisión", McGraw-Hill, 1999.