SUBJECT TEACHING GUIDE

G833 - Radiofrequency Electronics

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: Applied Electronics				
Course unit title and code	G833 - Radiofrequency Electronics				
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
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Other lecturers	LUISA MARIA DE LA FUENTE RODRIGUEZ

3.1 LEARNING OUTCOMES

- Apply strategies for resolving technical problems of their own profession.
  Ability to work cooperatively as a team.
  Student responsiveness to problems of real life working in the radio industry .
  Distinction of the peculiarities of RF and microwave electronic circuits compared to conventional electrical and electronic circuits of DC and low frequency .
  Acquainted with the fundamental elements of the basic architecture of RF systems .

4. OBJECTIVES

Introduction to the basic parameters and to characterization of the usual electronic systems and subsystems for RF operation.
Presentation of the typical architecture of a radio system:
Oscillators , PLLs, mixers, low noise amplifiers and power amplifiers: detailed analysis of each component.

Operating principles of the subsystems, common technologies for implementation , figures of merit, design techniques.

6. COURSE ORGANIZATION

CONTENTS	
1	Introduction : Principles of RF. Electronic distributed Systems. RF Topologies. Smith chart . S parameters small signal and low noise RF amplifiers .
2	Oscillators : RF Oscillators : VCO's , phase locked loops (PLL) synthesizers , phase noise.
3	Amplifiers : RF Power Amplifiers (HPA) , Figures of Merit , Efficiency , Linearity , Operation Classes .
4	Mixer Devices, figures of merit , topologies .

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Continuous assessment tests and exercises Part 1	Written exam	No	Yes	35,00
Lab practices	Laboratory evaluation	No	Yes	10,00
Oral presentation of selected topics	Oral Exam	No	Yes	5,00
	Written exam	No	Yes	40,00
	Laboratory evaluation	No	Yes	10,00
	Written exam	Yes	Yes	0,00
TOTAL				100,00

Observations

Continuous assessment (Learning Activities):
Written tests in the classroom: a total of four multiple-choice tests and / or development exams and / or solving exercises, one for each topic of the course will be conducted throughout the course. (Theory 40% exercises + 40%) The realization of these tests is linked to regular attendance, which may be controlled (>80%).
Laboratory practices will be evaluated with a rating practices for each theme. (20%)
Students could be also required to complete oral presentations in the classroom about related topics.
The overall rating for Continuous Assessment will be derived from the average of the four tests and practices (80% + 20%). In each case, in view of the results to account for, a minimum grade of each part in the global average will be established.
The labs are required to pass the subject having a weight of 20% of the final grade.
Final exam:
At the end of the course on the date set by the Faculty to do a written exam with theoretical and practical sections performed. (40% + 40%). The students who have followed the course through continuous evaluation process will not have to take the final exam, except those required to recover some part or to improve the qualification.

Observations for part-time students

Students who have not followed the continuous assessment must complete and submit the practices and also they have to do the final exam . The weight of the final exam is 80 % of the grade (40 % theory and exercises 40 %) with the remaining 20 % practice.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

"Microwave Transistor Amplifiers: Analysis and Design", Guillermo Gonzalez. Prentice Hall, 1984.

"Microwave Mixers", S. A. Maas, 3nd edn, Artech House, MA

"Microwave Devices, Circuits and Systems for Communicaions Engineering", Ed. I.G. Glover, S.R. Pennock y P.R. Shepherd, Wiley, 2005.

RF Power Amplifiers, Mariam K. Kazimierczuk, Ed. Wiley, 2008

"Microwave circuit design using linear and nonlinear techniques", George D. Vendelin, Anthony M. Pavio, Ulrich L. Rohde,

"Microwave Engineering", D. M. Pozar, J. Wiley & Sons 1998.

"The design of CMOS RF Integrated Circuits", Thomas H. Lee, Cambridge Press, 2006.

"Non Linear Microwave and RF Circuits", S. A. Maas, Artech House, 2003.

"Practical RF Circuit Design forModern Wireless Systems", Rowan Gilmore, Les Besser, Artech House, 2003.