SUBJECT TEACHING GUIDE

G1472 - Circuit and Systems Simulation

Degree in Telecommunication Technologies Engineering

Academic year 2019-2020

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: Optional Subjects				
Course unit title and code	G1472 - Circuit and Systems Simulation				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

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Other lecturers	ANGEL MEDIAVILLA SANCHEZ SERGIO MIGUEL SANCHO LUCIO

3.1 LEARNING OUTCOMES

- - After the finish course the student has sufficient knowledge and ability to analyze and design radio frequency and microwave devices both at the system level (top-down) as a circuit level (bottom-up) using CAD / CAM tools business.
- With this course students will be trained, of any of the three mentions in the use of simulators to cover all needs for design and analysis of any circuit and / or system.

4. OBJECTIVES

The aim of this course is to learn to handle the most significant simulators for systems and circuits in current telecommunication systems. After a brief introduction on the history of radio, a revision of certain basic aspects for the development of the subject is made. The actual content of the course is divided into two blocks depending on the type of technology to use: system-level simulation, or circuit level simulation.
The aim of the system simulation is to provide students with sufficient knowledge to analyze and design systems and subsystems used for telecommunications
The objective of circuit simulation is to provide students with a basic knowledge to analyze and design communication circuits. Besides an introduction to electromagnetic simulation 2D, 2.5D and 3D will be made to simulate waveguide devices and antennas

6. COURSE ORGANIZATION

CONTENTS	
1	Topic 1: INTRODUCTION TO COMMUNICATION SYSTEMS Brief History of Communications. Definition of communication bands. Generic architecture of communications systems. Unwanted signals. Transmission without distortion. Classification of telecommunication systems Topic 2: COMMUNICATION SYSTEMS SIMULATION Circuits and Systems Simulation: Geneys Agilent, Agilent ADS and AWR Microwave Office. Topic 3: MICROWAVE WAVEGUIDE DEVICES. Microwave passive waveguide devices Microwave: combiners, dividers (splitters), circulators, directional couplers, impedance inverters, Hybrid Filters.
2	Topic 4: Introduction to circuit simulation Brief history of the circuit simulators. Circuit simulators classic: PSPICE and Electronic Workbench. Topic 5: ADVANCED CIRCUIT SIMULATORS Simulators Advanced Circuits: Keysight Genesys, Keysight ADS and AWR Microwave Office. Topic 6: ELECTROMAGNETIC SIMULATORS 2D EM simulator (Empower), 2,5D EM simulator (Momentum) and 3D. (Keysight EMPro, HFSS, CST). Simulation of waveguides and antennas.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Evaluation using an assesment about all practical class-problems, simulations of this designs, made by the student.	Laboratory evaluation	No	Yes	40,00
Continuous evaluation The methodology is the continuous evaluation, both individual and group activities are evaluated. The continuous assessment include 100% of the evaluation of the subject, and requires the delivery of the problems and the realization	Work	No	Yes	60,00
TOTAL				100,00

Observations

Continuous evaluation
The methodology is the continuous evaluation, both individual and group activities are evaluated. The continuous assessment include 100% of the evaluation of the subject, and requires the delivery of the problems and the realization of the labs and classroom simulation. The contents of evaluation have a note from 0 to 10. To pass the course requires 5.0 The average of all assessment activities.
The following shows in detail the process of continuous evaluation mentioned in the previous paragraph:

1 - Testing Classroom

Differentiated test or control in each thematic block is performed.
The total score of tests in classroom get the average of the tests performed.

2 - Evaluation Classroom Practics + Problems + Scripts
Each practice will be evaluated at the end of it.
The total score of practices is obtained from the average of each of the practices + scripts them.

3 - Total Continuous Assessment Rating
Classroom Test score 60%
Rating Practices 40%

4 - Comments:

The student that has passed the subjectby continuous evaluation does not have to take the final exam of the course unless you want up note. In this case you can only take into account the final exam grade. In this final exam it will be added 10% of the average grade of paragraph 3, provided they have passed the 7 over 10 on continuous assessment, saturating the total mark + continuous examination in 10 out of 10.

Final exam
1 - A written examination of problems and issues will have two distinct parts corresponding to the two thematic blocks , which will be graded by the teachers who have taught for each thematic block theory is performed. Students who present the final exam must be submitted problems, problems and simulation practices.

2 - Total Rating final exam:
Written exam score 75%
Rating most practical problems simulation 25%

Observations for part-time students

This subject has been followed the convergence criteria of the European Higher Education Area (EHEA) regarding the ongoing assessment and evaluation form. Checks and test effected by theme (subject exams, small practices and design issues). Therefore although class attendance is not mandatory, it is highly recommended, as it provides better monitoring and understanding of theoretical concepts that have been put later into practice in resolving batteries problems and small practices or jobs simulation proposed in class for continuous evaluation.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

1. Collin, R.E., "Foundations for Microwave Engineering", McGraw-Hill, NY, 1992.
2. David M. Pozar, “Microwave engineering” ed. Addison- Wesley Publishing Company.Reeding M.A., 1993
3. G. Matthaei, L. Young, E.M.T. Jones, “Microwave filters, impedance-matching networks and coupling structures”, Ed. Artech House, 1980.
4. Jack Smith. "Modern Communication Circuits". McGraw Hill
5. D. Marcuse, Theory of Dielectric Optical Waveguides , 2Ed. Academic Press, Boston, 1991.
6. R.G. Hunsperger, Integrated Optics, 6Ed. Springer, Berlin, 2009.
7. K.J. Integrated Optoelectronics, Springer- Verlag, Berlin, 1993.
8. K. Iga & Y. Kokubun, Integrated Optics, Taylor & Francis, Boca Raton, 2006.
9. Agilent Genesys User’s Guide. Disponible on line en http://www.home.agilent.com .
10. Agilent ADS User’s Guide. Disponible on line en http://www.home.agilent.com .
11. AWR Microwave Offices User’s Guide. Disponible on line en http://web.awrcorp.com