Universida_{de}Vigo

Subject Guide 2023 / 2024

IDENTIFYIN	G DATA				
Radio Labo	ratory				
Subject	Radio Laboratory				
Code	V05M145V01209				
Study	Máster			,	
programme	Universitario en				
	Ingeniería de				
	Telecomunicación				
Descriptors	ECTS Credits		Choose	Year	Quadmester
	5		Optional	1st	2nd
Teaching	English				
language					
Department					
Coordinator	Torío Gómez, Pablo				
Lecturers	Torío Gómez, Pablo				
E-mail	ptorio@uvigo.es				
Web	http://moovi.uvigo.gal				
General description	Deepening in the knowledge synthesis	of the diverse systems	of radius applyin	g a practical met	hodology of analysis and

Training and Learning Results

Code

- A1 CB1 Knowledge and understanding needed to provide a basis or opportunity for being original in developing and/or applying ideas, often within a research context.
- A2 CB2 Students must apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
- B8 CG8 Ability to apply acquired knowledge and to solve problems in new or unfamiliar environments within broader and multidiscipline contexts, being able to integrate knowledge.
- C2 CE2 Ability to develop radio communication systems: antenna, equipment and subsystems design; channel modeling; link budgeting; and planning.
- C3 CE3 Ability to implement systems by cable, line, satellite, in fixed and mobile communication environments.
- C5 CE5 Ability to design systems of radio navigation and positioning, as well as radar systems.
- C13 CE13 Ability to apply advanced knowledge of photonics, optoelectronics and high-frequency electronics.

Expected results from this subject	
Expected results from this subject	Training and
	Learning Results
* Knowledge of the basic instrumentation for measuring radiofrequency, microwaves,	A1
millimeter and sub-millimeter waves	A2
	B8
	C2
	C3
	C5
	C13
* Knowledge of the main configurations for measuring characteristic parameters of different subsystems:	A1
Measure of impedance, transmission and	A2
reflection coefficients, noise factor, dynamic margin, and field strength level.	B8
	C2
	C3
	C5
	C13

* Knowdlege of experimental characterization techniques regarding the mechanisms of signal	A1	
propagation.	A2	
	B8	
	C2	
	C3	
	C5	
	C13	

Contents	
Торіс	
The students will realise some of the following	All of the tasks will be carried out as Laboratory Practices, using the
practical:	equipment available at the School.
1. Basic instrumentation.	
Measures of active elements.	
 Measure of parameters of transmission and 	
reflection in quadripoles	
 Measure of the noise factor 	
 Measure of reception parameters (noise, 	
selectivity, sensitivity, dynamic margin)	
 Effect of the LNA in the sensitivity of the 	
receptor and with this measured of propagation.	
· Measure of amplifiers of power of RF: efficiency,	
gain,	
 Measure of parameters of oscillators. 	
3. Measure of passive elements	
 Measured of passive filters of RF: losses, 	
selectivity,	
\cdot Measure of the frequency of cut of a wave guide	
· Measured of antennas: diagrams, gain and join	
up electromagnetic.	
· Measure of common elements of microwaves:	
circulators, directional couplers,	
Measures of propagation.	
 Measure of mitigation with distance 	
\cdot Measured of mitigation with obstacles. Analysis	
of the phenomena of transmission and reflection.	
· Statistical study of the variability of the signal	
5. Use of a radar.	
6. Measures of electromagnetic compatibility.	
7. Measures in millimeter and sub-millimeter	
bands	
8. Design, setting and measure of a LNA	
9. Design, setting and measure of an oscillator of	
RF.	
10. Analog modulations	
11. Digital modulations	
11. Network analyzers	
12. Software Defined Radio (SDR)	
13. Vector signal generators	
14. Digital Video Broadcasting Terrestrial (DVB-T)	
15. Digital Radio Mondiale (DRM)	
Dianatian	

Planning			
	Class hours	Hours outside the classroom	Total hours
Case studies	2	10	12
Laboratory practical	13	39	52
Lecturing	4	20	24
Laboratory practical	8	26	34
Problem and/or exercise solving	1	0	1
Problem and/or exercise solving	2	0	2
*The information in the planning table is for	or guidance only and does n	ot take into account the het	erogeneity of the students.

Methodologies	
	Description
Case studies	Practical demonstrations. A1, A2, B8, C2, C3, C5, C13.

Laboratory practical	Setting and measure of circuits and telecommunication systems. Employing specific instrumental. In groups. A1, A2, B8, C2, C3, C5, C13.
Lecturing	Explanation of the theoretical-practical basis of the work to be developed by the students in the laboratory. A1, A2, B8, C2, C3, C5, C13.
Laboratory practical	Practical demonstrations. A1, A2, B8, C2, C3, C5, C13.

Personalized assistance				
Methodologies	Description			
Laboratory practical	Doubts may be solved in the tutorial classes. These will take place in the following way: * Individually or in small groups (typically with a maximum of 2-3 people). * Unless the contrary is specified, previous appointment with the professor will be required. The appointment will be requested and acknoledged by email or else at moovi.uvigo.gal. Place and time will preferrably be as officially scheduled.			
Lecturing	Doubts may be solved in the tutorial classes. These will take place in the following way: * Individually or in small groups (typically with a maximum of 2-3 people). * Unless the contrary is specified, previous appointment with the professor will be required. The appointment will be requested and acknoledged by email or else at moovi.uvigo.gal. Place and time will preferrably be as officially scheduled.			
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Assessment					
	Description	Qualificatio	n	Training and Learning	Results
Laboratory practical	Laboratory practises 1	. 20		C2 C3 C5	
Laboratory practical	Laboratory practices 2	30	_	C13 C2 C3 C5	
Problem and/or exercise solvingMidterm 1		10		B8	
Problem and/or exercise solvingMidterm 2		40	A1 A2	B8	

Other comments on the Evaluation

FIRST CALL:

Two assessment systems are offered:

CONTINUOUS ASSESSMENT, that is the ordinary recommended method, around which educational activities are scheduled.SINGLE ASSESSMENT, which is recommended for those situations in which it results impossible to follow the ordinary method

CONTINUOUS ASSESSMENT

The continuous assessment consists of the proofs that detail to continuation:* Laboratory practices. Group assessment (Weight: 50%)* Proof of short answer. Individual assessment (Weight: 50%)

Attendance to the laboratory practices is considered as compulsory.

At the end of each practice session the students must hand in a report, reflecting the results obtained, which constitutes the subject of assessment.

The students choose continous assessment whenever they assist to any practice session and hand in the report, after the first course month.

When group assessment, all group components will obtain the same mark, provided that their contribution in the compulsory attendance sessions is reasonably similar.

Missed quizzes and/or lab classes will not be rescheduled.

Continuous assessment is only available provided that the student has attended 50 % of the practice sessions

If continuous evaluation has been elected, the final grade cannot be not presented.

EXAM-ONLY ASSESSMENTThe exam-only assessment consists of:* Examination on laboratory practice. Individual assessment (Weight: 50%)* Proof of short answer. Individual assessment (Weight: 50%)

SECOND CALL:The student been evaluated by Continuous Assessment can opt between two possibilities the same day of the examination:* Realise again the Proof of short answer in the official date assigned by the Centre and be evaluated according to the stipulated for the system of CONTINUOUS ASSESSMENT* Be evaluated with an only final examination in the official date assigned by the Centre, as the stipulated for the system of EXAM-ONLY ASSESSMENT.

The student not been evaluated by continuous Assessment:* will be evaluated with an only final examination in the official date assigned by the Centre, as the stipulated for the system of EXAM-ONLY ASSESSMENT

END OF PROGRAM CALL:

End of program calls will be assessed as stated in the above section Students who choose for exam-only assessment.

In the event of copycatting at any proof or work, the final assessment will be FAIL (0) and the event will be communicated to the Centre headmaster in order to conduct appropriate measures.

Sources of information
Basic Bibliography
Walter Tuttlebee, Software defined radio : Enabling technologies,
Fuqin Xiong, Digital modulation techniques ,
Complementary Bibliography
Ulrich Reimers, DVB : The family of international standards for digital video broadcasting,
M. E. Van Valkenburg, Network analysis ,
Wes Hayward, Introduction to radio frequency design,
George Brown, Radio and electronics cookbook,
John Davies, Newnes radio and RF engineer's pocket book,
Y.T. Lo, S.W. Lee, Antenna handbook,
Rajeswari Chatterjee, Antenna theory and practice,
Yi Huang, Kevin Boyle, Antennas : from theory to practice,
Walter C. Johnson, Transmission lines and networks ,
Brian C. Wadell, Transmission line design handbook ,

Recommendations

Subjects that continue the syllabus

Wireless and Mobile Communications/V05M145V01313 Satellites/V05M145V01311

Wideband Radio Systems/V05M145V01312

Subjects that are recommended to be taken simultaneously

Antennas/V05M145V01208 Optical Communications/V05M145V01207 Electronics and Photonics for Communications/V05M145V01202

Subjects that it is recommended to have taken before

Radiocommunication/V05M145V01103 Signal Processing in Communications/V05M145V01102