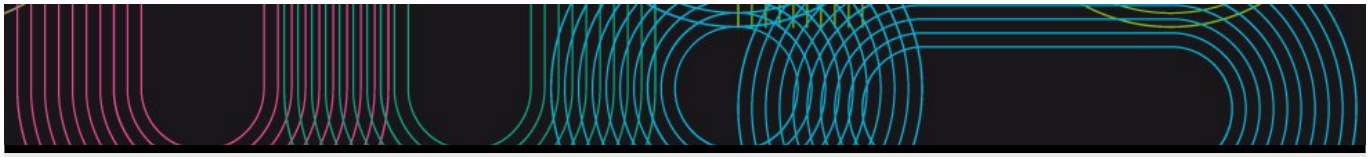

IDENTIFYING DATA				
Radio Frequency Circuits				
Subject	Radio Frequency Circuits			
Code	V05G300V01511			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	1st
Teaching language	Spanish			
Department				
Coordinator	Isasi de Vicente, Fernando Guillermo			
Lecturers	Isasi de Vicente, Fernando Guillermo Rodríguez Rodríguez, José Luis			
E-mail	fisasi@uvigo.es			
Web	http://cursos.faitic.uvigo.es/tema1415/claroline/course/index.php			
General description	Main radio system circuits are studied. In this matter main characteristics and structure are treated. The evaluation of this circuits is studied too.			

Competencies	
Code	
B4	CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.
B6	CG6: The aptitude to manage mandatory specifications, procedures and laws.
B8	CG8: To know and apply basic elements of economics and human resources management, project organization and planning, as well as the legislation, regulation and standarization in Telecommunications.
B9	CG9: The ability to work in multidisciplinary groups in a Multilanguage environment and to communicate, in writing and orally, knowledge, procedures, results and ideas related with Telecommunications and Electronics.
C24	CE24/ST4 The ability to select circuits, subsystems and systems of radiofrequency, microwaves, broadcasting, radio link and radio determination.
C25	CE25/ST5 The ability to select transmission antennas, equipment and systems, propagation of guided and non-guided waves, with electromagnetic, radiofrequency and optical media, and their corresponding radio electric spectrum management and frequency designation.
D2	CT2 Understanding Engineering within a framework of sustainable development.
D4	CT4 Encourage cooperative work, and skills like communication, organization, planning and acceptance of responsibility in a multilingual and multidisciplinary work environment, which promotes education for equality, peace and respect for fundamental rights.

Learning outcomes			
Expected results from this subject	Training and Learning Results		
New			
Learn to understand subcircuits' specifications and the impact that have such specifications in whole system. From these specifications learn to develop a circuit that fulfill them proposing solutions of engineering in which prices, terms, availabilities, etc. wich have a paramount importance.	B4 B8 B9	C24 C25	D2 D4
Learn the effect that each parameter of the specifications of a circuit has in the complete system.	B6		
Learn to analyse the priorities of the parameters in different circumstances.	B4 B6	C24 C25	D2 D4

Contents

Topic	
Main radiocommunication systems characteristics.	Non linear effects
Use of radiofrequency laboratory equipment.	Use and understanding of laboratory equipment: Spectrum analyzer Network analyzer Signal source
Filtros	Theorical and practical principles of radiofrequency filters.
Study of amplifiers.	Main characteristics Noise in amplifiers
Oscillators	Non linear treatment Oscillators measurement Voltage controlled oscillators (VCO) Phase noise
Mixers	Basic approach Main mixers structures
Frequency synthesizers	Based in PLL. Direct digital synthesis.

Planning			
	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	2.5	3.5
Master Session	17	42.5	59.5
Practice in computer rooms	2	3	5
Laboratory practises	16.5	33	49.5
Jobs and projects	1	1	2
Short answer tests	4	24	28
Practical tests, real task execution and / or simulated.	0.5	2	2.5
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Introductory activities	Student will be guided to study of previous required knowledge using various sources in order to adequate subject study. Student is encouraged to make use of tutorship hours in order to solve more difficult topics.
Master Session	Lecture at classroom using blackboard and computer about subject theory. Through this methodology the competencies CG4, CG6, CG8, CE24 y CE25 are developed.
Practice in computer rooms	Learning of some EDA (computer design applications) for design and test of radiocommunication systems. Through this methodology the competencies CG4, CG6, CG9, CE24 y CE25 are developed.
Laboratory practises	Radiocommunication systems measurements. Use of radiocommunication circuit measurement equipment. Basic knowledge about radiofrequency circuits manufacturing. Team work using official standards and specifications. Through this methodology the competencies CG4, CG6, CG9, CE24, CE25, CT2 y CT4. are developed.

Personalized attention	
Methodologies	**Description**
Laboratory practises	Practices in computer classroom as in the ones of laboratory and the practical proofs will resolve the doubts on the fly and will warn to the student that can be making some mistake. In the case of the works and projects will attend directly students' on the fly.
Practice in computer rooms	Practices in computer classroom as in the ones of laboratory and the practical proofs will resolve the doubts on the fly and will warn to the student that can be making some mistake. In the case of the works and projects will attend directly students' on the fly.
Tests	**Description**
Jobs and projects	Practices in computer classroom as in the ones of laboratory and the practical proofs will resolve the doubts on the fly and will warn to the student that can be making some mistake. In the case of the works and projects will attend directly students' on the fly.
Practical tests, real task execution and / or simulated.	Practices in computer classroom as in the ones of laboratory and the practical proofs will resolve the doubts on the fly and will warn to the student that can be making some mistake. In the case of the works and projects will attend directly students' on the fly.

Assessment

	Description	Qualification	Training and Learning Results	
Master Session	Class of blackboard in classroom with occasional support of computer,	0		
Practice in computer rooms	Tests in order to evaluate the correct comprension and ability in use of informatic tools.	5	B4	C24 C25
Laboratory practises	Questions of the professor and evaluation on the fly of the work of laboratory.	10	B4 B6	C24 C25
Jobs and projects	Project to work into a team. A presentation of the results will be done to professor in wich some questions could be asked. The team's member who presents results is chosen by random between all team's members.	20	B4 B6 B8 B9	C24 C25
Short answer tests	Examinations written of problems. Three examinations of evaluation continued (5%, 20%, and 25%) and an examination when finishing the course (50%) for which do not follow the continuous evaluation or for which like this prefer it. It considers that a student leaves the continuous evaluation if it has not presented at least to three of the examinations.	50	B4 B6	C24 C25
Practical tests, real task execution and / or simulated.	Evaluation of practic work. Results of the necessary calculations for the development of the practices.	15	B4 B6 B8	C24 C25

Other comments on the Evaluation

So much in the final examination as in the one of July, if a student has not done the practices or the projects of group C, will have to

do a practical examination (30% of the note) and/or a work to agree with the professor regarding the content (20%) and a

theoretical examination of problems in the official date of the examination (50%). So much the practical examination like the one of project

will realise in agreed date with the professor. The practical examinations and of project in the final examinations and July will be able to

do them, in addition to which want to present to the final examination, those that have not approved the practical type B or C.

For the groups C will pose a project to resolve between several students and his solution will expose by one or several

students of the group chosen of random form.

The examinations of problems will treat of the resolution of problems and/or exercises based in the theory explained in the

introductory activities, in the masterclass and in the laboratories.

Except that *ellja only evaluation, the laboratory is compulsory admitting a percentage of faults of 20%. The practices

are recoverable during the course speaking with the professor to look for a schedule if this is possible.

Like practical proofs will ask to the student that realise similar measures to the ones of the practices and will do him oral questions

to evaluate the degree of understanding of the matter.

If it chooses only evaluation the notes of the examinations of evaluation *contínua do not have any validity. In case of no

arrive to the approved in continuous evaluation, the student will have to present to the final examination in which it will ask on

all the matter. The notes of groups B and C will keep , however, if the student like this decides it. This decision will have to

communicate to the professor before the examination.

Sources of information

Electrónica de comunicaciones, **M. Sierra y otros**, 1,

Apuntes de la asignatura, **F. Isasi**, 1,

Solid state radio engineering, **Kraus, Bostian y Raab**, 1,

James W. Nilsson, Susan A. Riedel, **Circuitos eléctricos**, 7,

Recommendations
Subjects that continue the syllabus
Microwave Circuits/V05G300V01611
Wireless Systems and Networks/V05G300V01615

Subjects that it is recommended to have taken before
Physics: Fundamentals of Electronics/V05G300V01305
Signal Transmission and Reception Techniques/V05G300V01404
Electronic Technology/V05G300V01401
Electromagnetic Transmission/V05G300V01303