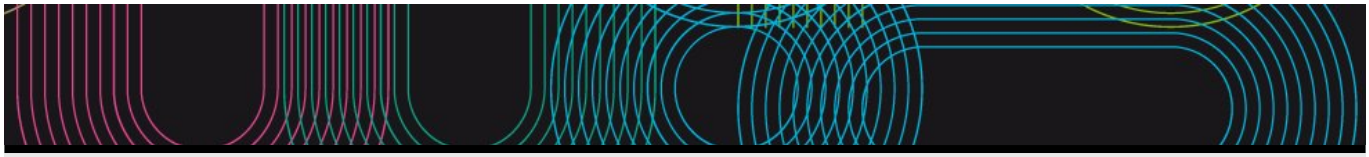

IDENTIFYING DATA				
Radio Frequency Circuits				
Subject	Radio Frequency Circuits			
Code	V05G301V01319			
Study programme	Grado en Ingeniería de Tecnologías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	1st
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Torío Gómez, Pablo			
Lecturers	Torío Gómez, Pablo			
E-mail	ptorio@uvigo.es			
Web	http://moovi.uvigo.gal/course/view.php?id=286			
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. International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results	
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.

Expected results from this subject	Training and Learning Results		
- Learn to understand the specifications of a subcircuit and the impact these specifications have on the system as a whole. From these specifications, learn how to develop a circuit that complies with them by proposing engineering solutions in which prices, deadlines, availability, etc. are of paramount importance. - Learn the effect that each parameter of the specifications of a circuit has on the complete system. - Learn to analyse the priorities of the parameters as appropriate.	B4 B6 B8 B9	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
Frequency synthesizers	Based in PLL. Direct digital synthesis.
Mixers	Basic approach Main mixers structures

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	17	24	41
Practices through ICT	12	4	16
Laboratory practical	7	2	9
Problem and/or exercise solving	2	27	29
Problem and/or exercise solving	2	27	29
Problem and/or exercise solving	2	24	26

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Exhibition by part of the faculty of the contents of the matter, boosting the critical discussion of the concepts. They seat the theoretical bases of algorithms and procedures used to resolve problems.
Practices through ICT	Cooperative work in computer classroom, with software of simulation
Laboratory practical	Cooperative work in a reduced group, with instrumental of measure, in conditions of laboratory.

Personalized assistance

Methodologies	**Description**
Lecturing	In the established tutorial classes the teacher will attend the doubts that can arise. These tutorial classes will be made individually or in reduced groups. They will be attended after previous appointment that will be requested by email or in moovi.uvigo.gal.
Laboratory practical	In the established tutorial classes the teacher will attend the doubts that can arise. These tutorial classes will be made individually or in reduced groups. They will be attended after previous appointment that will be requested by email or in moovi.uvigo.gal.
Practices through ICT	In the established tutorial classes the teacher will attend the doubts that can arise. These tutorial classes will be made individually or in reduced groups. They will be attended after previous appointment that will be requested by email or in moovi.uvigo.gal.
Tests	**Description**
Problem and/or exercise solving	In the established tutorial classes the teacher will attend the doubts that can arise. These tutorial classes will be made individually or in reduced groups. They will be attended after previous appointment that will be requested by email or in moovi.uvigo.gal.
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Assessment

	Description	Qualification	Training and Learning Results

Practices through ICT	Assistance to practical sessions in computer classroom, justified by the report of each practice	4.8	B4 B6 B9	C24 C25
Laboratory practical	Active assistance to practical sessions of laboratory, justified by the report of each practice	10	B4 B6	C24 C25
Problem and/or exercise solving	Examination written of evaluation, with questions and problems referents to the contents of the sessions *magistrales 1	30	B4 B6	C24 C25
Problem and/or exercise solving	Examination written of evaluation, with questions and problems referents to the contents of the sessions *magistrales 2	30	B4 B6	C24 C25
Problem and/or exercise solving	Examination written on the practical sessions in the computer classroom	25.2	B4 B6 B9	C24 C25

Other comments on the Evaluation

Following the specific guidelines of the qualification, two assessment systems will be offered to those studying this subject: Continuous assessment, which is the recommended method and around which teaching activities are organized, and a Global assessment option, that is recommended only in those situations where it is impossible to follow the suggested system.
Types and rating of sections: * Master sessions. Individual rating (Weight: 60%)* Practices in computer science classes. Individual rating (weight: 30%)* Laboratory practices. Individual rating (weight: 10%)
CONTINUOUS ASSESSMENTA person is considered to be following the continuous assessment procedure when he or she submits to a punctuable test or continuous assessment examination.If the continuous assessment is chosen, the final rating may not be not present.
The ongoing assessment consists of the tests described below in this guide.* Examinations on the content of master sessions.* Practices in computer science classes. Their assessment is based on active assistance justified by the report of each practice and a final examination.* Lab practices. Their assessment is based on active assistance justified by the report of each practice.
In order to ensure that all competences in the subject matter are acquired, approval will require the following two conditions to be met together:1) Get a score equal to or greater than a 4 (on a scale of 0 to 10), in each type of activity.2) Obtain an overall score, calculated as the sum of the activities scores weighted by the corresponding weight, equal to or greater than 5 (on a scale of 0 to 10)If only condition 2) and not condition 1) is met, the overall score for the subject will be 4.9.
Continuous assessment practices and examinations are not recoverable.The continuous assessment reviews have no impact beyond the continuous assessment procedure.A person who has not completed at least 50% of the practices may not take the continuous assessment procedure.
CONTINUOUS ASSESSMENTThose who do not opt for continuous assessment will be assessed through a single final examination on the official date assigned by the Centre, at which the content of all activities will be assessed, in such a way that it is demonstrated that they have acquired the same competences as those who opted for the continuous assessment.In order to ensure that all competences in the subject matter are acquired, approval will require the following two conditions to be met together:1) Get a score equal to or greater than a 4 (on a scale of 0 to 10), in each of the different sections in which the examination is divided. These sections correspond to the types of activity described above.2) Obtain a overall score in the examination equal to or greater than a 5 (on a scale of 0 to 10).
EXTRAORDINARY OPPORTUNITY CALLThe person who has been assessed by Continuous Assessment can choose between two options on the same day of the examination:* Maintain the qualification corresponding to their attendance to the practices and take all the Continuous Assessment exams on the official date assigned by the Centre.* Be assessed with a single final examination at the official day assigned to the Centre, as stipulated for the comprehensive assessment system
The person who has NOT been assessed by Continuous Assessment will be assessed with a single final examination on the official date assigned by the Centre, as stipulated for the global assessment system.
FINAL CALLIn the end-of-career call, the student will be assessed with a single final examination on the official date assigned by the Centre, as stipulated for the Global Assessment System.
In case of detection of plagiarism in any of the tests or works, the final rating will be FAIL (0) and the fact will be communicated to the management of the Centre for the appropriate purposes.
ENGLISH FRIENDLYThe international students will be able to request to the professor material and bibliographic references for the follow-up of the subject, attend the tutorials, proofs and evaluations in English.

Sources of information

Basic Bibliography

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

Complementary Bibliography

Electrónica de comunicaciones, **M. Sierra y otros**, 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/V05G301V01322
Wireless Systems and Networks/V05G301V01326

Subjects that it is recommended to have taken before

Physics: Analysis of Linear Circuits/V05G301V01108
Mathematics: Calculus 1/V05G301V01101
Mathematics: Calculus 2/V05G301V01106
Signal Transmission and Reception Techniques/V05G301V01208
Electronic technology/V05G301V01206
Analogue Electronics/V05G301V01311

Other comments

Studens should be skillful in network analisys and know the small signal equivalent circuits.
Electronics subjects around the transistor must be reviewed.