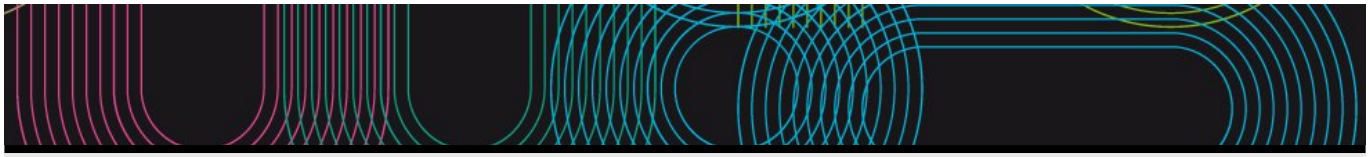

IDENTIFYING DATA				
Radio Spectrum Management				
Subject	Radio Spectrum Management			
Code	V05G300V01616			
Study programme	Degree in Telecommunications Technologies Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	2nd
Teaching language	Spanish			
Department				
Coordinator	García Sánchez, Manuel			
Lecturers	García Sánchez, Manuel Torío Gómez, Pablo			
E-mail	manuel.garciasanchez@uvigo.es			
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General description	The management of the radioelectric spectrum, a natural resource, limited and scarce, pursues the most efficient use of the spectrum by means of the application of effective processes, to facilitate the implementation of communication systems and to guarantee minimum interference. To acomplish this objectives, engineering tools, planning, management and technical survey and certification are needed. Besides in this matter study of the SMATV systems and Structured Wiring are included.			

Competencies	
Code	
B5	CG5: The knowledge to perform measurements, calculations, assessments, appraisals, technical evaluations, studies, reports, task scheduling and similar work to each specific telecommunication area.
B6	CG6: The aptitude to manage mandatory specifications, procedures and laws.
B7	CG7: The ability to analyze and assess the social and environmental impact of technical solutions.
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.
C21	CE21/ST1 The ability to construct, exploit and manage telecommunication networks, services, process and applications, considered as systems of receiving, transporting, representation, processing, storage, management and presentation of multimedia information from the point of view of transmission systems.
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.
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	
Understand the concepts of frequency allocation, allotment and assignment.	B6	C21
Apply concepts of base station certification.	B6 B7 B8	C21
Propose solutions for fulfilment the broadcast limits.	B5 B6 B7 B8	C25

Interference analysis	B5 B6 B8 B9	C21 C25	D4
Telecommunications Cabling Standards	B5 B6 B8	C21 C25	
Field measurements	B5 B9	C21 C25	D4

Contents

Topic	
Introduction	Introduction to the matter. General concepts.
Spectrum management	National and international regulatory bodies International management and coordination National management The Telecommunications Law National telecommunication Plans CNAF
Spectrum engineering	Specifications of telecommunication equipmnet. Radio wave propagation. Coverage. Interferences. Re-use distance. Techniques to share the spectrum.
Modulations	Definitions The radio channel Objective of the modulation Types Analog Modulations: AM, FM Digital Modulations Wideband Modulations
Frequency planning	Trellis method List method Other methods Examples
Technical surveillance	The specrrum analyzer The wideband sounder measurement procedures for radioelectric base station certification
SMATV	Introduction Rules Design Examples
Structured wiring.	Introduction Rules Design Examples

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practises	1	2	3
Tutored works	3	45	48
Practice in computer rooms	6	6	12
Outdoor study / field practices	11	11	22
Others	2	25	27
Master Session	19	19	38

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

Methodologies

	Description

Laboratory practises	Activities of application of the acquired knowledge to particular situations. Acquisition of basic skills related with the matter. Specific measurement equipment as Spectrum Analysers , Field level sounders, etc, will be used. Through this methodology the competencies CG5, CG6, CG8, CG9, CE21, CE25 and CT4 are developed.
Tutored works	The student, alone or in a small group with other students, elaborates a report on a given subject. This includes the search of the information, reading, writting, etc Through this methodology the competencies CG9 and CT4 are developed.
Practice in computer rooms	Activities of application of the acquired knowledge to particular situations. Acquisition of basic skills related with the matter using computer programs. Through this methodology the competencies CG5, CG6, CG8, CG9, CE21, CE25 and CT4 are developed.
Outdoor study / field practices	Field activities. Activities of application of the acquired knowledge to particular situations. Acquisition of basic skills related with the matter. Specific measurement equipment as Spectrum Analysers , Field level sounders, etc, will be used. Through this methodology the competencies CG5, CG6, CG8, CG9, CE25 and CT4 are developed.
Others	Written exam on the contents of the matter. Through this methodology the competencies CG5, CG6, CG7, CG8, CE21 and CE25 are developed.
Master Session	Master lecture given by the teacher. Through this methodology the competencies CG5, CG6, CG7, CG8, CE21 and CE25 are developed.

Personalized attention

Methodologies	Description
Master Session	The students will be able to resolve doubts and questions during the face-to-face hours of the activity, in schedule of *tutorías or by means of email.
Laboratory practises	The students will be able to resolve doubts and questions during the face-to-face hours of the activity, in schedule of *tutorías or by means of email.
Tutored works	The students will be able to resolve doubts and questions during the face-to-face hours of the activity, in schedule of *tutorías or by means of email.
Practice in computer rooms	The students will be able to resolve doubts and questions during the face-to-face hours of the activity, in schedule of *tutorías or by means of email.
Outdoor study / field practices	The students will be able to resolve doubts and questions during the face-to-face hours of the activity, in schedule of *tutorías or by means of email.

Assessment

	Description	Qualification	Training and Learning Results		
Laboratory practises	Measurement of signals on panel for distribution of TV signal. This practice is made in groups and the qualification of each student will be the one of the group.	2.5		C21 C25	
Tutored works	Monographss on subjects related to spectrum management that will be presented in class. They will be evaluated in an individual way in function of the exhibition realised by each student.	15	B9		D4
Practice in computer rooms	Calculation of the coverage area of an AM radio station. This practice is made in groups but will be evaluated individually by means of the assistance, the performance during the realisation and by means of the memory of the practice delivered by the group.	5	B6 B9	C21 C25	D4
Outdoor study / field practices	Basic use of a spectrum analyzer. Measurement of the bandwidth of a FM signal. Measurement of TDT signals. They will be evaluated by means of a written exam at the end of the practice. Installation of a parabolic antenna. Phase 1 and phase 2 radio station measurements. These practices will be made in groups and the qualification of each student will be the one of the group.	27.5	B5 B7 B9	C21 C25	D4
Others	Written exams of the contents of the matter. Individual evaluation.	50	B6 B7 B8	C21 C25	

Other comments on the Evaluation

1) Following the guidelines of the degree will offer the students two schemes of evaluation in the common call: continuous evaluation and final evaluation. The students will have to opt by one of the two o. The delivery or participation in any one of

the tasks of continuous evaluation means that he/she opts by this type of evaluation. The assistance to the practices is compulsory if he/she opts by continuous evaluation.

a) Continuous Evaluation. The continuous evaluation will be made based on the performance of the student during the practical sessions, on the report of the computer practice and on the tests of the others seven practices. The supervised work will be assessed by means of its presentation in a class. There will be two partial written exams of theory, one around the middle of the class period and another at the end. These tasks are not recoverable and only are valid for the current course.

b) Final evaluation. The students that do not opt by continuous evaluation will have an exam of theory (50%) and another of the practical part (50%) in the official date of the exam agreed by the School.

2) Extraordinary call (July). The students that opted previously by continuous evaluation will be able to opt between repeating the exam of theory (50%) or examine again of all the matter (100%) by means of two exams that will cover the theory (50%) and the practical part (50%). They will have to communicate to the coordinator the option they choose before the official date of the exam. The rest of the students will examine of all the matter by means of two exams that will cover the theory (50%) and the practical part (50%).

Sources of information

Basic Bibliography

International Telecomunication Union, **National Spectrum management Manual**, 2005,

Complementary Bibliography

International Telecomunication Union, **ITU-R recommendations**,
International Telecomunication Union, **Radiocomunication Rules**, 2012,
Gretel-COIT, **La evolución de la gestión del espectro radioeléctrico**, 2007,
SETSI, **Cuadro Nacional de Atribución de Frecuencias**, 2013,

Recommendations

Subjects that it is recommended to have taken before

Signal Transmission and Reception Techniques/V05G300V01404
Electromagnetic Transmission/V05G300V01303
Radio Communication Systems/V05G300V01512