Universida_de_Vigo

IDENTIFYING DATA
Wireless Systems and Networks

Subject	Wireless Systems and Networks
Code	V05G300V01615
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación

Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	2nd

Teaching language	Spanish
Department	
Coordinator	Pérez Fontán, Fernando
Lecturers	Pérez Fontán, Fernando
E-mail	fpfontan@tsc.uvigo.es
Web	http://http://faitic.uvigo.es/
General description	(*)(*) A general overview of current wireless communications systems will be provided including standards and dimensioning issues.

Competencies

Code	
A1	CG1: The ability to write, develop and sign projects in the field of Telecommunication Engineering, according to the knowledge acquired as considered in section 5 of this Law, the conception and development or operation of networks, services and applications of Telecommunication and Electronics.
A4	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.
A7	CG7: The ability to analyze and assess the social and environmental impact of technical solutions.
A30	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.
A31	CE22/ST2 The ability of applying the basic techniques of telecommunication networks, services and applications for mobile and fixed environments, personal, local or long distance, with different bandwidth, including telephony, radio broadcasting, TV and data, from the point of view of transmission systems.
A34	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.

Learning aims

Expected results from this subject	Training and Learning Results
(*) To build, operate and manage telecommunication networks, services, processes and applications from the a transmission systems point of view	A1 A30
(*) To apply techniques based on telecommunications networks, services and applications for fixed, mobile, personal, local or long range scenarios with different bandwidths, including telephony, broadcasting and data from a transmission systems point of view.	A4 A31

- Cellular and wireless network specifications.

- Provide access solutions to communications systems.

- Develop roll-out models which minimize the social and environemntal impact of the radio communication networks, understanding the ethic and moral resposabilities involved in such work.

(*) Selection of antennas, equipment and transmission systems, guided and radiated wave propagation, spectrum management and frequency assignment.

A7
A34

- To apply previously acquired knowledge on wave propagation for the planning of radio networks.

- To specify the various elements (antennas, transmitters and receivers) which make up a global system.

Contents

Topic	
Theory 1. Introduction to radiocommunications	Basic concepts Current situation Wireless LANs Personal networks.
Theory 2. Cellular systems	Fundamental concepts The radio propagation channel Multiple access techniques Interferencr Traffic theory Network sizing up Countermeasures Medium access control. Security and access control. Network management. Mobility management. Quality of service.
Theory 3. Review of cellular and wirelss lan standards and other proposals	2nd generation systems Evolution of 2G systems 3rd generation systems Beyond 3G WLAN systems Other systems and proposals Cognitive access Femtocells.
Lab 1. Statistical analysis of simulated and/or measured time-series	Analysis of simulated and/or experimental time-series
Lab 2. Introduction to multipath effects	Reproducing multipath fading Doppler effect Narrow and wideband channel
Lab 3. Introduction of blockage/shdowing effects	Simulation of the shadowing effect Call handover Interference

Planning

	Class hours	Hours outside the classroom	Total hours
Tutored works	7	14	21
Troubleshooting and / or exercises	6	18	24
Practice in computer rooms	14	28	42
Master Session	13	26	39
Short answer tests	1	0	1
Reports / memories of practice	0	8	8
Troubleshooting and / or exercises	1	0	1
Jobs and projects	0	14	14

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

Methodologies

	Description
Tutored works	Simulation work to be carried out in Matlab language will be proposed to C class gropus where they will go deeper into specific issues discussed in less detail in the theoretical classes.
Troubleshooting and / or exercises	The theoretical treatment of the various topics studied in theoretical classes will be complemented by performing numerical calculations relative to radio network dimensioning
Practice in computer rooms	In laboratory sessions (type B) various Matlab simulations will be proposed to the students in order to study specific topics which are more suitably aproached this way.
Master Session	In classroom lectures the more theoretical issues will be presented

Personalized attention

Methodologies	Description

Master Session	The student can individually ask for clarifications on the various topics relative to this lecture (theory, problems, lab and turored work) during tutoring hours	
Tutored works	The student can individually ask for clarifications on the various topics relative to this lecture (theory, problems, lab and turored work) during tutoring hours	
Troubleshooting and / or exercises	The student can individually ask for clarifications on the various topics relative to this lecture (theory, problems, lab and turored work) during tutoring hours	
Practice in computer rooms	The student can individually ask for clarifications on the various topics relative to this lecture (theory, problems, lab and turored work) during tutoring hours	

Assessment

	Description	Qualification
Short answer tests	Adequate kowledge of the theoretical materials of the lecture will be assessed by means of short response questions during the final exam.	25
Reports / memories of practice	For each lab assignment, the studens in pairs, will present a written report and will respong to oral questions on the work carried out.	25
Troubleshooting and / or exercises	In the final exam, there will be a part containing various short numerical problems.	25
Jobs and projects	The evaluation of supervised group work (C classes) will be carried out through an oral presentation, a report and oral questions during the presentation.	25

Other comments on the Evaluation

If possible all skills pertaining to this subject will be evaluated in all the various tests and exercises proposed: short answer tests, lab reports, problem solving and projects

For those who choose to take the final examan (alternatively to continuous assessment), this will have a weight of 100% of the final grades and will cover all issues dealt with in the theoretical lectures, the problem solving lectures, tutored group work and laboratory.

Above the precedure for carrying out the continouos assesment was presented. The final grades will be the result of four equal weight parts, namely

- a theoretical test consisting of short questions (25%) to take place during the final exam,

- a problem solving test consisting of short numerical calculations (25%) to take place during the final exam,

- the completion of the laboratory work and corresponding reports (25%) and

- the completion of the proposed tutored group work, its corresponding report and oral presentation (25%)

The grades for the lab. work and group work will only be valid during the current school year.

Those students who choose the continuous assessment option shall inform the professor of this during the first few weeks of the school term. The continuous assessment option entails the completion of all activities proposed: lab works and group work, and taking all tests comprising the continuous assessment route. Those students not fulfilling the above will be assessed with the final exam only.

A student will be atributed the "no presentado" grade if he or she has not followed the full continuous assessment route and has not taken the final exam.

For the retake call (July), the grades obtained in the lab work and group work parts will be kept for those students following the continous assessment route and will only be required to take the theory and problems part of the new final exam. However, he or she can also opt for taking the full final exam.

Sources of information

José María Hernando Rábanos, **Comunicaciones Móviles. 2ª ed.**, Ed. Centro de Estudios Ramón Areces, S.A.,

Fernando Pérez Fontán, Sigfredo Pagel Lindow, **Introducción a las. Comunicaciones Móviles**, Servicio de Publicaciones. Universidad de Vigo,

José María Hernando Rábanos, **Comunicaciones Móviles de Tercera Generación**, Telefónica Móviles,

Simon R. Saunders, **Antennas and Propagation for Wireless Communications Systems**, Wiley,

José María Hernando Rábanos, Fernando Pérez Fontán, **Introduction to Mobile Communications Engineering**, Artech House,

F.Pérez-Fontán and P.Mariño Espiñeira, **Modeling of the wireless propagation channel. A simulation approach with Matlab**, Wiley,

Ramón Agustí Comés, **LTE: nuevas tendencias en comunicaciones móviles**, Fundación Vodafone,

Recommendations

Subjects that it is recommended to have taken before
Physics: Fields and Waves/V05G300V01202
Mathematics: Probability and Statistics/V05G300V01204
Fundamentals of Sound and Image/V05G300V01405
Signal Transmission and Reception Techniques/V05G300V01404
Electromagnetic Transmission/V05G300V01303
Radio Frequency Circuits/V05G300V01511
Radio Communication Systems/V05G300V01512