# Universida<sub>de</sub>Vigo

#### Subject Guide 2015 / 2016

IDENTIFYIN	G DATA			
Electronic C	Communication Systems			
Subject	Electronic			
	Communication			
	Systems			
Code	V12G330V01922			
Study	(*)Grao en			
programme	Enxeñaría en			
	Electrónica			
	Industrial e			
	Automática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	<u>1st</u>
Teaching	Spanish			
language				
Department				
Coordinator	Soto Campos, Enrique			
Lecturers	Soto Campos, Enrique			
E-mail	darzveidar@yahoo.com			
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General	The aim of this subject is to teach the basis	of the theory of communic	ations, in part	icular of the digital
description	communications and of the electronic syste	ems used in them.	•	-
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Com	Jompetencies			
Code	9			
B3	CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and			
	provide them the versatility to adapt to new situations.			
B4	CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate			
	and transmit knowledge and skills in the scope of industrial engineering in the field of Industrial Electronic and			
	Automation.			
C21	CE21 knowledge of the fundamentals and applications of digital electronics and microprocessors.			
D2	CT2 Problems resolution.			
D3	CT3 Oral and written proficiency in the own language.			

D9 CT9 Apply knowledge.

D17 CT17 Working as a team.

Learning outcomes Expected results from this subject Training and Learning Results Knowledge of basic communications theory. Β3 C21 D2 D3 D9 Knowledge of the foundations of the digital communications. Β3 C21 D2 D3 D9 Knowledge of the most common and important considerations of the digital communications C21 D2 processes. D3 D9 Knowledge of the hardware implementations of a digital communications system. C21 B4 D2 D9 D17 Understanding of how the general theory applies to communications buses for industrial B4 D3 applications. D9 D17

Topic

1. Introduction to communications systems	Elements of a communication system. Electromagnetic spectrum. Time		
	and frequency domain. Noise and communications.		
2. Introduction to digital communications systems Systems classification. Sampling. Quantification. PCM.			
3. The ISO OSI standard	Definitions. Justification. OSI Levels.		
4. Physical layer: transmission media	Wires and categories. Microwaves links. Satellite channels. Optical fibre.		
5. Physical layer: base band modulation	Definitions. Digital standards. Base band modulations. Classification. Clock recovery. Spectrum. AC coupling. Error protection. Trasparency.		
6. Physical layer: pass band modulation	Analog standards. Electrical attributes. Pass band modulations: in amplitude, phase and frequency.		
7. Physical layer: parallel standards	Parallel port. GPIB BUS.		
8. Data link layer: Functions	Definitions. Frame synchronisation and trasparency.		
9. Data link layer: transmission error control	Error control codes. Block codes. Linear group codes. Cyclic codes.		
	Convolutional codes: Viterbi algorithm .		
10. Data link layer: Coordination of the	Centralised. Contention.		
communication			
11. Data link layer: sharing of the physical circuit	Static allocation: Multiplexing. Dynamic allocation: Distributed. Random		
	access. Regulated access. Spread spectrum systems.		
12. Data link layer: failure recovery and flow	Mechanisms of failure recovery. Protocols of flow control.		
control			
13. Data link layer: Protocols	Character oriented protocols: ASCII. Bit oriented protocols: HDLC.		
14. Hierarchy of communications in the industry	CIM. Examples. Field buses.		
15. Wide-band Networks	Convergence of networks of data and voice. ATM. DSL.		
16. Analog communications	AM. FM. Television.		

## Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	21	31.5	52.5
Classroom work	4.5	18	22.5
Troubleshooting and / or exercises	5	7.5	12.5
Previous studies / activities	0	22.5	22.5
Autonomous troubleshooting and / or exercises	0	20	20
Laboratory practises	18	0	18
Short answer tests	2	0	2
*The information in the planning table is for guida	nce only and does no	at take into account the het	arogeneity of the students

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

# Methodologies

	Description
Master Session	Most important aspects of the subjetc will be explained, looking for the active participation of the student posing questions that has to resolve in class.
Classroom work	These assigments look for the student to apply the exposed basic theory in class to real systems and in this way understand this theory and how is put in practice. They will make it in groups to boost team work. They will be presented in class.
Troubleshooting and / or exercises	The students will resolve in class with the help of the professor exercises of application of the theory.
Previous studies / activities	Preparatory work masterclass: the student has to read the subject previously to be able to pose any doubts that arise to the professor. Preparatory work resolution problems: the student has to at least have tried to resolve the problems proposed to understand better their resolution. Preparatory work laboratory: the student has to read and prepare the practice previously for his correct undestanding.
Autonomous troubleshooting and / or exercises	With the aim of checking the success of the learning process, the student will have at his disposal bulletins of problems to resolve on their own.
Laboratory practises	Laboratory practices will be done on Promax EC-796 systems, trainers of digital communications, where they will see in practice digital communications systems.

Personalized attention			
Methodologies	Description		
Laboratory practises	The students will be able to access academic support through the office time of the professor and email.		
Master Session	The students will be able to access academic support through the office time of the professor and email.		

Classroom work	The students will be able to access academic support through the office time of the professor and email.
Troubleshooting and / or exercises	The students will be able to access academic support through the office time of the professor and email.
Tests	Description
Short answer tests	The students will be able to access academic support through the office time of the professor and email.

Assessment				
	Description	Qualification	Training	g and Results
Master Session	The participation in class with comments and questions will be valued.	5	B3 C21	D2 D3 D9
Classroom work	Presentation of the assignment: description of an applied communication system. The fulfillment of this task is a requirement to obtain a pass.	30	C21	D2 D3 D9 D17
Troubleshooting and / or exercises	The participation in class with the resolution of problems will be valued.	5	B4 C21	D2 D3 D9
Laboratory practises	The realization of all the tasks of each practice will be graded in function of their fulfillment. The evaluation criteria are: minimum attendance of an 80%, punctuality, previous preparation, fulfillment and results.	20	C21	D3 D9 D17
Short answer tests	This test will be performed on the date of the final exam. It is conceived to check the basic knowledge of the subject.	40	C21	D2 D3 D9

#### Other comments on the Evaluation

The student must obtain a minimum of 5 over 10 in each of the parts: laboratory practices, classroom work and short answer test, to obtain a pass qualification in the subject.

Optionally assignments can be done in English.

Students who waive the continuous assessment must pass a written test more extensive than that of the minimum knowledge applied to the rest.

It is expected that the student will have an adequate ethical behaviour. If a non-ethical behaviour is detected (copy, plagiarism, utilization of unauthorized electronic devices, for example), it will be considered that the student does not fulfill the necessary requirements to pass the subject. Depending of the kind of the non ethical behaviour detected, it could be concluded that the student has not fulfilled the competences B2, B3 and CT19.

#### Sources of information

Roy Blake, **Electronic Communications Systems**, Delmar Thomson Learning, Carl Nassar, **Telecommunications Demystified: A Streamlined Course in Digital Communications (and Some Analog) for EE Students and Practicing Engineers**, LLH Technology Publishing, Ian Glover, Peter M. Grant, **Digital Communications (3rd Edition)**, Prentice Hall, Roy Blake, **Sistemas electrónicos de comunicaciones**, Mexico, D.F. : International Thomson,

#### Recommendations

Subjects that continue the syllabus

Digital Electronics and Microcontrollers/V12G330V01601

#### Subjects that it is recommended to have taken before

Fundamentals of Electronics/V12G330V01402 Basics of Circuit Analysis and Electrical Machines/V12G330V01303 Digital Electronics and Microcontrollers/V12G330V01601

#### Other comments

To enrol in this subject it is necessary to have passed or at least be enrolled in all the subjects of the previous courses to the course in that this subject is located.