



## IDENTIFYING DATA

### Electronic communication systems

Subject	Electronic communication systems			
Code	V12G770V01414			
Study programme	PCEO Grado en Ingeniería Mecánica/Grado en Ingeniería en Electrónica Industrial y Automática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Soto Campos, Enrique			
Lecturers	Soto Campos, Enrique			
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Web	<a href="http://moovi.uvigo.gal/">http://moovi.uvigo.gal/</a>			
General description	<p>The aim of this subject is to teach the basis of the theory of communications, in particular of the digital communications and of the electronic systems used in them.</p> <p>English Friendly subject: 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.</p>			

## Training and Learning Results

Code

## Expected results from this subject

Expected results from this subject Training and Learning Results

## Contents

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 communication	Centralised. Contention.
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 control	Mechanisms of failure recovery. Protocols of flow 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. Security in industrial communications.	Introduction. Threats classification. Protection measures.
16. Wide-band Networks	Convergence of data and voice networks. ATM. DSL.
17. Analog communications	AM. FM. Television.

<b>Planning</b>			
	Class hours	Hours outside the classroom	Total hours
Lecturing	21	31.5	52.5
Mentored work	4.5	18	22.5
Problem solving	5	7.5	12.5
Previous studies	0	22.5	22.5
Autonomous problem solving	0	20	20
Laboratory practical	18	0	18
Problem and/or exercise solving	2	0	2

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

<b>Methodologies</b>	
	Description
Lecturing	Most important aspects of the subject will be explained, looking for the active participation of the student posing questions that has to resolve in class.
Mentored work	These assignments 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.
Problem solving	The students will resolve in class with the help of the professor exercises of application of the theory.
Previous studies	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 understanding.
Autonomous problem solving	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 practical	Laboratory practices will be done on Promax EC-796 systems, trainers of digital communications, where they will see in practice digital communications systems.

<b>Personalized assistance</b>	
Methodologies	Description
Laboratory practical	In tutoring hours doubts on the approach of the practices will be attended. During the practices themselves help will be available to any difficulty that arise on the set up as long as the answer to the doubt is not answered in the documentation or in the practice.
Lecturing	In tutoring hours any doubts on the already exposed subject in the master session will be resolved.
Mentored work	In tutoring hours support and orientation for the assignments will be provided. It includes support on the content and on the form of the assignment.
Problem solving	In tutoring hours possible doubts on the resolution of problems will be resolved.
Tests	Description
Problem and/or exercise solving	During the short answer test only doubts of clarification will be answered.

<b>Assessment</b>			
	Description	Qualification	Training and Learning Results
Mentored work	Presentation of the assignment: description of an applied communication system. The fulfillment of this task is a requirement to obtain a pass.	30	
Problem solving	The participation in class with the resolution of problems will be valued.	5	
Laboratory practical	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.	25	

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### Other comments on the Evaluation

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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.

Those students who cannot attend two or more laboratory sessions for the justified reasons set forth in the Student Statute, will have the right to a single laboratory test to be held in the exam period of the corresponding call established by the school.

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.

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### Sources of information

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#### Basic Bibliography

J. S. Beasley, J. D. Hymer, Gary M. Miller, **Electronic Communications: A System Approach**, 1, Pearson, 2014

#### Complementary Bibliography

Ian Glover, Peter M. Grant, **Digital Communications**, 3, Prentice Hall, 2009

Roy Blake, **Electronic Communications Systems**, 2, Delmar Thomson Learning, 2001

Carl Nassar, **Telecommunications Demystified: A Streamlined Course in Digital Communications (and Some Analog) for EE Students and Practicing Engineers**, 1, LLH Technology Publishing, 2001

Roy Blake, **Sistemas electrónicos de comunicaciones**, Mexico, D.F. : International Thomson, 2004

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### Recommendations

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#### Subjects that continue the syllabus

Digital electronics and microcontrollers/V12G330V01601

#### Subjects that are recommended to be taken simultaneously

Digital electronic systems/V12G330V01923

#### 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

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### Other comments

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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.

In particular, those students who have not studied successfully the subject 'Electrónica Digital y Microcontroladores' will find themselves unable to follow this subject.

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