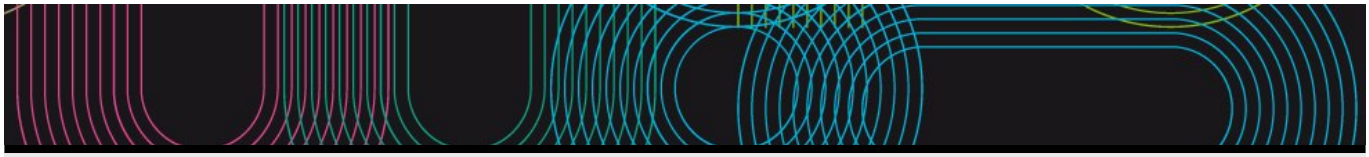

IDENTIFYING DATA				
(*)Sistemas electrónicos para comunicacións dixitais				
Subject	(*)Sistemas electrónicos para comunicacións dixitais			
Code	V05G300V01623			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	2nd
Teaching language	Spanish			
Department				
Coordinator	Machado Domínguez, Fernando			
Lecturers	Machado Domínguez, Fernando Pastoriza Santos, Vicente Poza González, Francisco			
E-mail	fmachado@uvigo.es			
Web	http://faitic.uvigo.es			
General description	The overall objective of this course is to provide the theoretical and practical skills for the analysis and design of electronic systems for digital communications. To achieve this, several wire and wireless communication standards will be reviewed and the basic architectures of digital communication systems, the design of the electronic circuits that compose these systems and their functionality will be studied.			

Competencies	
Code	
A49	(CE40/SE2): The ability to select electronic circuits and devices specialized in transmission, forwarding or routing, and terminals for fixed and mobile environments.

Learning aims	
Expected results from this subject	Training and Learning Results
Knowledge of transmission-reception principles and general considerations on the transmission-reception circuits (transceivers).	A49
Knowledge of the basic digital communication systems architecture and the functional design of these systems.	A49
Ability to design different basic subcircuits that compose the transmision-reception circuits of a digital communication system.	A49
Ability to select circuits and electronic devices specialised for fixed and mobile digital communications.	A49

Contents	
Topic	
Unit 1. Introduction	Introduction and review of the basic concepts of transmission-reception and general considerations on the transmission-reception circuits. Basic architecture of digital communications systems. Different hardware and software implementations: ASIC, DSP and FPGA.
Unit 2. Wired communication systems	Introduction to serial communication systems. Transmission media, signals and bit encoding. Transceiver circuits. Medium access methods.
Unit 3. Asynchronous serial communication systems	Asynchronous serial communication protocols. Standards and practical implementations.
Unit 4. Synchronous serial communication systems	Synchronous serial communication protocols. Standards and practical implementations.

Unit 5. High-speed synchronous serial communication systems	High-speed synchronous serial communication protocols. Differential technologies. Standards and practical implementations.
Unit 6. Radio frequency identification systems. Near-field communications	RFID technology. Near-field communications. Standards and practical implementations.
Unit 7. Wireless communication systems	Wireless communication protocols. Wiireless networks characteristics and configurations.
Unit 8. Short range wireless communication systems	Wireless communication protocols of short range and low consumption. WPAN Networks. Characteristics and analysis of the wireless sensors networks. Standards and practical implementations.

Laboratory	
Block 1. Wired asynchronous serial communication circuits	Design, implementation and test of an asynchronous serial communication circuit. Transceivers.
Block 2. Wired synchronous serial communication circuits	Design, implementation and test of a synchronous serial communication circuit. Clock recovery.
Block 3. Wireless communication circuits	Design, implementation and test of a wireless communication circuit. Using and configuring communication modules.
Block 4. Project: Design and implementation of a digital communications system	Design, implementation and test of a digital communication system. Applying theoretical and practical concepts.

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	2	4	6
Master Session	12	12	24
Troubleshooting and / or exercises	4	4	8
Laboratory practises	8	20	28
Integrated methodologies	6	24	30
Others	5	12	17
Short answer tests	3	28	31
Reports / memories of practice	1	2	3
Jobs and projects	1	2	3

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

Methodologies

	Description
Introductory activities	Subject presentation. Presentation of laboratory sessions, instrumentation and software resources to be used.
Master Session	The lecturer will explain in the classroom the main contents of the subject. The students have to manage the proposed bibliography to carry out a self-study process in a way that leads to acquire the knowledge and the skills related to the subject. The lecturer will answer the students questions in the classroom or in the office.
Troubleshooting and / or exercises	Activities designed to apply the main concepts of the subject to solve problems and exercices. The lecturer will explain a set of problems and the students have to solve diferent take-home sets of problems. The lecturer will answer the students questions in the classroom or in the office.
Laboratory practises	Activities designed to apply the main concepts and definitions of the subject. The student will be asked to acquire the basic skills to manage the laboratory instrumentation, software tools and components in order to construct and test electronic circuits. The student has to develop and demonstrate autonomous learning and collaborative skills. Possible questions can be answered in the laboratory sessions or in the lecturer's office.
Integrated methodologies	Project-based learning: students have to develop a group activity that goes on over a period of time and address a specific problem. They have to design, schedule and carry out a set of tasks to achieve a solution. The assessment will be based on the quality of the proposed solution, the depth of content understanding demonstrated and the final presentation. The sessions will be performed in the laboratory.
Others	Small-group activities. The lecturer will answer the students questions and also give instructions to guide the project development process. The students will study and discuss possible solutions and design alternatives, identify key elements and analyze results.

Personalized attention

Methodologies	Description
Master Session	The lecturer will answer the students questions and also give instructions to guide the studying and learning process. The students can go to the lecturer's office. The timetable will be available on the subject website at the beginning of the term.

Troubleshooting and / or exercises	The lecturer will answer the students questions and also give instructions to guide the studying and learning process. The students can go to the lecturers office. The timetable will be available on the subject website at the beginning of the term.
Laboratory practises	The lecturer will answer the students questions and also give instructions to guide the studying and learning process. The students can go to the lecturers office. The timetable will be available on the subject website at the beginning of the term.
Integrated methodologies	The lecturer will answer the students questions and also give instructions to guide the studying and learning process. The students can go to the lecturers office. The timetable will be available on the subject website at the beginning of the term.

Assessment		
	Description	Qualification
Laboratory practises	The lecturers will check the level of compliance of the students with the goals related to the laboratory skills. Marks for each session will be assessed in a 10 points scale. Final mark of laboratory, FML, will be assessed in a 10 points scale.	20
Short answer tests	The lecturers will check the level of compliance of the students with the goals related to the theory skills. Marks for each test will be assessed in a 10 points scale. Final mark of theory, FMT, will be assessed in a 10 points scale.	30
Jobs and projects	The lecturers will consider the results and the quality of the analysis performed in the developed project. Group project mark (GPM) will be assessed in a 10 points scale.	50

Other comments on the Evaluation

1. Continuous assessment

According to the guidelines of the degree and the agreements of the academic commission, a continuous assessment learning scheme will be offered to the students.

When the students perform a short answer test or attend at least two laboratory sessions, ***they will be assessed by continuous assessment***.

The subject comprises three different parts: theory (30 %), laboratory (20%) and group project (50%). Once a task has been assessed, the students can not do/repeat the task at a later date. The marks are valid only for the current academic course.

1.a Theory

Two short answer tests (SAT) are scheduled. The first test (SAT1) will be performed after unit 5, in the usual weekly scheduling of the theoretical classes. The second test (SAT2) will be performed during the examination period in the date specified in the academic calendar. Marks for each test will be assessed in a 10 points scale. The minimum mark required to pass this part is of 4 (SATi>=4). The final mark of theory (FMT) is calculated as the arithmetic mean of the individual marks:

FMT = (SAT1 + SAT2)/2

The students cannot do the tests at a later date. The student who miss a test will be assessed with a mark of 0 for that test.

If the minimun mark in the first test is not achieved (SAT1 less than 4), the students can repeat this part in the same date of the second test.

1.b Laboratory

Four laboratory sessions are scheduled. Each session lasts approximately 120 minutes and the students will work in pairs. This part also will be assessed by continuous assessment. Each session will be only evaluated according to the developed work at the schedule date. The lecturers will consider the work of the students carried out before the laboratory session to prepare the proposed tasks, the work in the laboratory to deal with them as well as the students behavior. Marks for each laboratory session (LSM) will be assessed in a 10 points scale. A mark of 0 will be obtained for missing sessions. In order to pass the laboratory part the students can not miss more than one laboratory sessions. The final mark of laboratory (FML) is calculated as the arithmetic mean of the individual laboratory session marks:

FML = (LSM1 + LSM2 + LSM3 + LSM4)/4

1.c Group project

In the first session lecturers will present the objectives and the schedule of the project. They also assign a specific project to each group. After that, the most important part of the workload will be developed in the laboratory. Six hours of B laboratory sessions and six hours of C laboratory sessions. In order to assess the project, the lecturer will consider the results, their

analysis and presentation, and the quality of the written report. The group project mark (GPM) will be assessed in a 10 points scale. The students are only allowed to miss one project session. The minimum mark required to pass this part is of 4 (GPM>=4).

1.d Final mark of the subject

The weighted points from all assessed parts are added together to calculate the final mark (FM). The following weightings will be applied: 30% theory (FMT), 20% laboratory (FML) and 50% group project (GPM). In order to pass the subject, students will be require to pass the theory, laboratory and group project parts. In this case the final mark (FM) will be:

FM = (0.3·FMT + 0.2·FML + 0.5 GPM)

However, when the students do not pass both parts (FMT or GPM less than 4) or do not reach the minimum mark of 4 required to pass each short answer test or miss more than 1 laboratory sessions or miss more than 1 project sessions, the final mark will be:

FM = (0.3·FMT + 0.2·FML + 0.5 GPM)·3.5/7

A final mark higher than five points (FM >= 5) should be achieved in order to pass the subject.

2. Final Exam

The students who prefer a different educational policy can attend an exam on a scheduled date. This exam will comprise three parts (similar to the activities completed by the continuously assessed students): theory exam, laboratory exam and project.

The theory exam will be assessed in a 10 points scale. The minimum mark required to pass this part is of 4 (FMT>=4).

The laboratory exam will be assessed in a 10 points scale. The minimum mark required to pass this part is of 4 (FML>=4).

The project will be assessed in a 10 points scale. The project will be assigned following the procedure described in advance by the lecturer. The student will prepare a written report to be handed in just before the exam. The final project must be presented within one week of delivery of reports. The minimum mark required to pass this part is of 4 (GPM>=4).

In order to pass the subject, students will be required to pass each part (FMT>=4, FML>=4 and GPM>=4). In this case the final mark (FM) will be:

FM = (0.3·FMT + 0.2·FML + 0.5 GPM)

However, when the students do not reach the minimum mark of 4 required (FMT or FML or GPM less than 4), the final mark will be:

FM = (0.3·FMT + 0.2·FML + 0.5 GPM)·3.5/7

A final mark higher than five points (FM >= 5) should be achieved in order to pass the subject.

3. Second opportunity to pass the subject

The assessment policy in this call will follow the scheme described in the previous section. Dates will be specified in the academic calendar. This exam consist on a theory exam, a laboratory exam and a project. In order to attend the laboratory exam and to assign the proyect, the students have to contact to the lecturer according to an established procedure. The procedure will be published in advance.

The marks obtained in the previous continuous assessment or final exam are kept for those parts in which the student has not attended. The final mark will be calculated as it has described in section 2.

Sources of information

F. Machado, V. Pastoriza, F. Poza, **Sistemas Electrónicos para Comunicaciones Digitales**, Curso 2013/2014,

B. Sklar, **Digital communications. Fundamentals and applications**, 2ª Ed.,

P. Mariño, **Las comunicaciones en la empresa. Normas, redes y servicios**, 2ª Ed.,

S. Mackay, E. Wright, D. Reynders, J. Park., **Practical industrial data networks : design, installation and troubleshooting**, 1ª Ed.,

R. Faludi, **Building wireless sensor networks**, 2011,

H. Lehpamer, **RFID design principles**, 2012,

Recommendations

Subjects that are recommended to be taken simultaneously

(*)Sistemas de adquisición de datos/V05G300V01521

Subjects that it is recommended to have taken before

(*)Comunicación de datos/V05G300V01301
(*)Electrónica dixital/V05G300V01402
(*)Técnicas de transmisión e recepción de sinais/V05G300V01404
(*)Electrónica analóxica/V05G300V01624