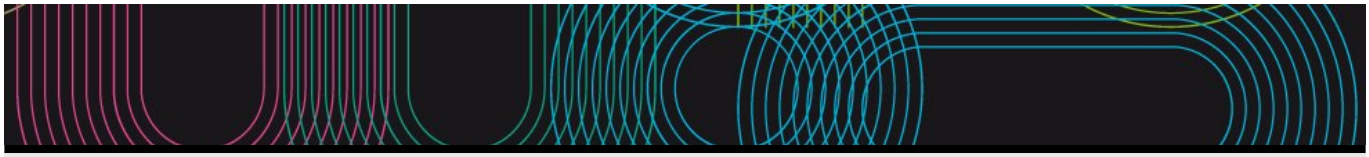

IDENTIFYING DATA				
(*)Sistemas de adquisición de datos				
Subject	(*)Sistemas de adquisición de datos			
Code	V05G300V01521			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	1st
Teaching language	Spanish			
Department				
Coordinator	Río Vázquez, Alfredo del			
Lecturers	Río Vázquez, Alfredo del			
E-mail	ario@uvigo.es			
Web	http://webs.uvigo.es/ario/docencia/sad/sad.htm			
General description	This subject is about acquisition data, including instrumention amplifiers, analog switches, S&H and converters.			

Competencies	
Code	
A52	(CE43/SE5): The ability to design analogical and digital electronics circuits of analogical to digital conversion and vice versa, of radiofrequency, of feeding and electrical energy conversion for computing and telecommunication engineering.
A54	(CE45/SE7): The ability to design interface, data capturing and storage devices, and terminals for services and telecommunication systems.

Learning aims	
Expected results from this subject	Training and Learning Results
Knowledge of instrumentation amplifiers, and control about its use.	A52 A54
Knowledge of the different types of electronic analogue switches and the control of applications.	A52 A54
Knowledge of Sample&Hold circuits and their applications in data acquisition.	A52 A54
Knowledge of the operation of different DAC and ADC converters, and the control of their applications.	A52 A54
Knowledge about data storage and the control of their applications.	A52 A54
Knowledge of the design of data acquisition using the previous elements.	A52 A54

Contents	
Topic	
Analogue signals adaption	Analog multiplexers Digitally controlled amplifiers an basic attenuators

Galvanic isolation	Inductive isolation Capacitive isolation Optical isolation
Sample and hold	Sample and hold circuits Anti-alias filters
DACs I	DAC based on a multiplexer and a linear resistive network Digital potentiometers Switching DAC with weighting resistors
DACs II	Unipolar DAC with an R/2R network, in current mode. Unipolar DAC with an R/2R network, in voltage mode.
DACs III	Bipolar DACs. Indirect operation DACs.
ADCs I	Flash ADC. Half-flash ADC (sub-ranging)
ADCs II	Single-slope analogue ADC. Dual-slope analogue ADC. ADC based on successive aproximation register (SAR).
ADCs III	ADC based on a voltage-controlled oscillator (VCO) and a frequency-meter. ADC based on sigma-delta.
ADCs IV	ADC based on switching capacitors. Other applications based on switching capacitors.
Lab work 1	The instrumentation amplifier. Analogue multiplexer.
Lab work 2	Galvanic isolation amplifier. Optical coupler.
Lab work 3	Anti-alias filter. Sample and hold circuits.
Lab work 4	DACs based on R/2R network. Voltage mode. Current mode.
Lab work 5	Dual-slope ADC. Operational in bipolar mode.
Lab work 6	ADC using successive aproximation register (SAR). SAR based on software.

Planning

	Class hours	Hours outside the classroom	Total hours
Troubleshooting and / or exercises	4	22.5	26.5
Tutored works	7	20	27
Laboratory practises	12	38	50
Master Session	15	27.5	42.5
Short answer tests	0.5	0	0.5
Troubleshooting and / or exercises	1	0	1
Short answer tests	0.5	0	0.5
Troubleshooting and / or exercises	1	0	1
Practical tests, real task execution and / or simulated.	1	0	1
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies

	Description
Troubleshooting and / or exercises	The lecturer will solve some exercises related to the subject.
Tutored works	The lecturer will lead the students in a data acquisition system design.
Laboratory practises	Simulations and real assembled circuits will be tested.
Master Session	The lecturer will show some theoretical contents related to the subject.

Personalized attention

Methodologies	Description

Master Session	Students are permitted to interrupt the session in order to ask the lecturer for some doubt related to the session.
Troubleshooting and / or exercises	Students are permitted to interrupt the session in order to ask the lecturer for some doubt related to the session.
Tutored works	Students are permitted to interrupt the session in order to ask the lecturer for some doubt related to the session.
Laboratory practises	Students are permitted to interrupt the session in order to ask the lecturer for some doubt related to the session.

Assessment

	Description	Qualification
Tutored works	Every student has to write a document related to the asigned work.	10
Short answer tests	First short answer test, in the classroom.	15
Troubleshooting and / or exercises	First exercise test, in the classroom.	15
Short answer tests	Second short answer test.	15
Troubleshooting and / or exercises	Second exercise test.	15
Practical tests, real task execution and / or simulated.	Laboratory-work exam based on simulations and real circuits.	30

Other comments on the Evaluation

Other comments and second exam-time

NOTE: The timing of the partial exams might suffer some changes, due to time restrictions. The exact timing will be indicated along the course.

CONTINUOUS EVALUATION OPTION:

The subject is evaluated in a continue way, by mean of two partial exams. These exams treat the theoretical aspects. In addition, there is an exam for the lab-work.

The student who passes the first partial exam will hold his/her mark along the course. This exam includes themes from one to five.

The second partial exam includes themes from six to ten.

The weight of both partials is a 60% from the total mark.

The first partial takes place in the classroom, within the class time. This partial is approximately 90 minutes long. The first 30 minutes will be dedicated to an exam with short answers. The rest 60 minutes will be dedicated to an exam with long answers.

Inside each partial, the 90 minutes exam and the 30 minutes exam have the same weight.

In order to pass a partial exam (the first or the second), the student is required to obtain at least a mark of 5 over 10.

The student that passes the first partial will only have to try the second partial. The second partial shares the same structure than the first.

The student that does not pass the first partial will have to try the first and the second partials.

The lab-work is evaluated using a unique exam, in the laboratory. The weight is 30%.

Tutored works are assessed using a report that every student should be done. The weight is 10%.

When a student attends the first partial, he or she accepts to follow the continuous assessment.

The mark that a student obtains in the lab-work is maintained until July, except if the student does not want. In this case, the student will have to do partials and lab exams in July.

In order to pass the subject, the student has to obtain a global mark (GM) of at least 5 points in ten. The global mark is calculated following the next formula:

GM = 0.6 * TM + 0.3*LM + 0.1*RM

where

TM = theory mark ; LM = lab mark ; RM = report mark

If the student does not obtain a mark of at least 5 in the first partial or in the second, the global mark would be the least mark between 4 and the GM taken from the early formulae.

The first partial is preview to take place in the sixth week.

The second partial will take place the same day of final exam.

The lab exam will take place in the lab, the day of the last lab session.

FINAL EXAM OPTION

The students that do not follow the continuous assessment, will be assessted by means of a final exam.

The assessment of lab work takes place in the lab by means of an exam, during the final exams period. The lab work exam will be 2 hours long. The weight of the lab work exam will be 40%.

In order to pass the subject, the student has to obtain a global mark (GM) of at least 5 points over ten. The global mark is calculated following the next formulae:

GM = 0.6 * TM + 0.4*LM

where:

TM = theory mark ; LM = lab mark

If the student does not obtain a mark of at least 5 in the first part or in the second part, the global mark would be the least mark between 4 or the GM taken from the early formulae.

IMPORTANT:

If a student did not enter the continuous assessment mode but is interested in participate in the final exam, he or she should talk with the professor at least two weeks before the day of the exam. Contact can be by e-mail. This help in the organization of the lab work exam.

RECOVERY EXAM

The recovery exam (June-July) shares the same structure than the first.

Sources of information
Paul Horowitz y Winfield Hill, **The Art of Electronics**, Cambridge Univ. Press.,
Sergio Franco, **Design with operational amplifiers...**, WCB/McGraw-Hill,
Franco Maloberti, **Data Converters**, ISBN978-0-387-32485-2,

Analog Devices Library,
hhtp;//www.analog.com/library/analogDialogue/archives/43-09/EDCh%206%20Converter.pdf, Capitulos 6.1,6.2,6.3,

Recommendations

Subjects that continue the syllabus

(*)Electrónica analóxica/V05G300V01624

Subjects that are recommended to be taken simultaneously

(*)Electrónica analóxica/V05G300V01624

Subjects that it is recommended to have taken before

(*)Tecnoloxía electrónica/V05G300V01401

Other comments

I recommend the students to search the web for information about this subject. Electronic devices factories show interesting information. Many universities around the world hung interesting notes in the Internet. And many of them for free.