SUBJECT TEACHING GUIDE

G77 - Applied Electronics

Degree in Physics

Academic year 2016-2017

1. IDENTIFYING DATA					
Degree	Degree in Physics			Type and Year	Optional. Year 4
Faculty	Faculty of Sciences				
Discipline	Subject Area: Applied Electronics Mention in Applied Physics				
Course unit title and code	G77 - Applied Electronics				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web	http://moodle.unican.es/moodle27/				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA
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3.1 LEARNING OUTCOMES
- To be able to use electronic devices based on their models. To be able to interpret the external specification of the device from manufacturers' data sheets, and be able to integrate the device as part of a functional module.
- To know the electronic basic modules and be able to interconnect them to construct systems with a planned functionality.
- To know the principal strategies to interconnect functional modules in order to construct electronic systems. To be able to deduce linear and not linear, static and dynamic behavior of a system based on the characteristics of its modules.
- To know the use of electronic instrumentation to measure and model a physical phenomenon.
- To know the principles of digital electronics, and the design methods of combinational and sequential digital circuits.
- To be able to evaluate the effects that interferences and real characteristics of systems have in the measurement processes.

4. OBJECTIVES

The subject, with a strong practical orientation, aims to introduce students into those electronic devices and analogical and digital electronic circuits more frequently used in electronic measurement systems. The objectives are three:
- To know the electronic devices models, analyze and design with them electronic circuits and interconnect these circuits to build electronic measurement systems.
- The student will have to be able to use manufacturers' data sheets of electronic devices and circuits to extract and interpret the information provided, and know how the real behavior of electronic systems is influenced by these devices and circuits.
- The students will have to be able to measure skilfully using laboratory electronic instrumentation, both manually and programming the instruments with a computer, as well as evaluate the effects that interferences and real characteristics of the equipments have in the measurement processes.

6. COURSE ORGANIZATION

	CONTENTS
1	Electronic devices: Models and characterization of electronic devices. Biasing and small signal models of electronic devices. Analysis of electronic circuits.
2	Electronic circuits: Operational amplifier and feedback circuits. Amplification, noise and interferences. Frequency response of electronic circuits: Filters. Stability. Circuits with transducers and sensors.
3	Digital electronics: Combinational and sequential circuits. Memory elements, counters, control systems.
4	Electronic systems: Electronic systems interconnection. Reference circuits and power supplies. Sampling, analog to digital and digital to analog conversion.
5	Instrumentation system architectures: Instrumentation system elements. Instrument buses. Computer controlled instrument systems.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
LABORATORY PRACTICALS	Laboratory evaluation	No	Yes	50,00
PROJECTS	Work	No	Yes	10,00
REPORTS OF THE LABORATORY PRACTICALS	Work	No	Yes	40,00
TOTAL				100,00

Observations

The assessment will be exclusively continuous, and will be made by means of two types of activities:
- Projects presentation: Presentation and defense of systems designed or made both individually and as a team. The aim of these exams is to evaluate the student's ability to apply the acquired knowledges and present them in public.
- Project developments: Assembly or utilization of an electronic equipment or measurement system in the laboratory. The aim of these exams is to evaluate the students' ability to use the instruments available in the laboratory and build experimentation environments.

Any activity handed in after the required deadline will have a mark equal to zero.

To pass the subject is necessary to obtain a weighted average mark equal to or greater than 5 in the continuous assessment (see details in assessment methods).

The subject is considered as a face-to-face practical learning and, for this reason, the laboratory practicals are mandatory. Nevertheless, those students who have regularly attended (70%) the classroom and laboratory practical lectures and have fulfilled at least 70% of the practical work but in the continuous assessment have an average mark less than 5 will be evaluated by means of a final exam with the following characteristics:
- Exam format: It will consist of a practical development, corresponding to the complete syllabus of the subject, which will be made in the laboratory. Questions will be about the theoretical and practical contents of the subject.
- Exam mark: Each question will have a score. The sum of all the scores will be 10. To pass, the exam mark must be equal to or greater than 5.
- Subject final mark = 0.5*Exam mark+0.5*Continuous assessment average mark.

Observations for part-time students

As far as practicable, the lecturers will try to make it possible for these students to take the subject.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

MALVINO, A. and BATES, D.J., Principios de Electrónica. McGraw-Hill, 2007.

COUGHLIN, R.F., Operational amplifiers and linear integrated circuits. Prentice Hall, 2001.

MANO, M.M., Diseño Digital. Prentice Hall, 2003.

GRANDA, M. y MEDIAVILLA, E., Instrumentación electrónica: transductores y acondicionadores de señal. PUbliCan, Ediciones de la Universidad de Cantabria, 2010.