

SUBJECT TEACHING GUIDE

G812 - Basic Electronics

Degree in Telecommunication Technologies Engineering

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Telecommunication Technologies Engineering			Type and Year	Core. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Electronics Basic Training Module				
Course unit title and code	G812 - Basic Electronics				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web	http://moodle.unican.es				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA				
Name of lecturer	GUSTAVO A. RUIZ ROBREDO				
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Office	Facultad de Ciencias. Planta: + 2. DESPACHO PROFESORES (2050)				
Other lecturers	JUAN A. MICHELL MARTIN				

3.1 LEARNING OUTCOMES

- Analysis of linear and non-linear applications of operational amplifiers.
- Design of MOS single-stage and multistage amplifiers.
- Design and analysis of MOS differential amplifiers.
- Analysis of a basic CMOS OA.
- Frequency response of the amplifiers.
- Understanding of concepts and technical implications of the resolution of exercises and practical work in the laboratory.
- Proper use of basic electronic instrumentation.
- Ability to analyze and solve problems both theoretically and practically.
- Use of internet resources for finding information: databases, component distributors, manufacturers, etc.
- Understanding the datasheet of electronic components.
- Encouraging team work.

4. OBJECTIVES

The main goal of this subject is to properly manage the basic tools of analysis and design of analog and digital electronic circuits. To achieve this, it involves:

- 1) Using of the circuit models of electronic devices to analyze and design basic analog blocks (current sources and voltage references, single-stage amplifiers, differential amplifiers, cascode) and operational amplifiers.
- 2) Characterization of basic analog blocks and operational amplifiers, with special emphasis on the practical applications.
- 3) Gaining background in the analysis and design of basic CMOS digital circuits.
- 4) Acquiring the ability to assemble, simulate and verify basic analog blocks in the laboratory, and develop some ease in handling basic electronic instrumentation equipment.
- 5) Handling the manufacturers' datasheets and get used to writing technical reports.

6. COURSE ORGANIZATION

CONTENTS

1	THEMATIC BLOCK A. Operational amplifiers and operational: Basic concepts. Practical considerations of the operational amplifier. Linear and non-linear applications. Signal generators.
2	THEMATIC BLOCK B. Models of MOS transistors for analog applications. Current sources and voltage references. Single stage and multistage MOS amplifiers. Frequency response. The MOS differential pair. CMOS differential amplifiers. Operational Amplifiers CMOS.
3	THEMATIC BLOCK C. Logic Families. Basic CMOS digital circuits. Dynamic and transmission gate circuits. Memory elements.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written exam in the classroom. Resit exam in February and September.	Written exam	No	Yes	30,00
Written exam in the classroom. Resit exam in February and September.	Written exam	No	Yes	30,00
Written exam in February. Resit exam in September.	Written exam	No	Yes	15,00
Two practical exams, continuous assessment of practicals 12 and 13 (15%), and several small tests (35%).	Laboratory evaluation	No	No	25,00
TOTAL				100,00

Observations

The final grade is obtained according to the following equation:

$$\text{Final Grade} = (\text{Exam Block A}) * 0.30 + (\text{Exam Block B}) * 0.30 + (\text{Exam Block 3}) * 0.15 + (\text{Practical tests in the laboratory}) * 0.25$$

This subject is passed if the Final Grade is greater than or equal to 5.0. However, Exam Block A and Exam Block B should both be greater than or equal to 5.0.

The grade of the Practical test in the laboratory is derived from the average of the two practical tests in the laboratory (50%), by continuous assessment of practicals 12 and 13 (15%) and by several small tests (35%).

Resit exams of Exam Block A and Exam Block B are in February and September.
Resit exam of Exam Block C is in September.

Notice: According to the University policy, cheating is penalised with 0.

Observations for part-time students

Grades of part-time students follows the same criteria as the rest of the students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

- D. J. Dailey. Operational Amplifiers and Linear Integrated Circuits: Theory and Applications. McGraw Hill, 1989.
- G. A. Ruiz. Electrónica Básica para Ingenieros. Servicio de Publicaciones de la Universidad de Cantabria. 2009.
- B. Razavi. Fundamentals of Microelectronics (1st Edition). Wiley, 2008.
- A. S. Sedra y K. C. Smith. Microelectronic Circuits. Oxford University Press, 2010.
- J. P. Uyemura. Chip Design for Submicron VLSI: CMOS layout and Simulation. Thomson. 2006.