COURSE DATA

Data Subject	
Code	34813
Name	Analogue Electronics I
Cycle	Grade
ECTS Credits	6.0
Academic year	2018 - 2019

Study (s)

Degree	Center	Acad. year	Period
1402 - Degree in Telecommunications Electronic Engineering	School of Engineering	2	Second term

Subject-matter

Degree	Subject-matter	Character
1402 - Degree in Telecommunications Electronic Engineering	16 - Electronics	Obligatory

Coordination

Name	Department
GUERRERO MARTINEZ, JUAN FCO	242 - Electronic Engineering

SUMMARY

Analogue Electronics I is a subject of a second degree course in *Electronics & Telecommunication Engineering.* As shown in the curriculum, the descriptors of this subject within the subject "Electronics" establish the following topics:

1. Signals, systems and basic analog components.
2. Transistor amplifiers and feedback in electronic systems.
3. Power supplies and regulators.
4. Operational amplifiers.
5. Analog-digital conversion.

It is, therefore, a subject whose content is essential for the initiation of Grade in *Electronics & Telecommunication Engineering.* This subject is continued in the Analogue Electronics II to be taught in the third year of the same degree.
Analog Electronics I reviews the most commonly used electronic components, both passive and active, and basic circuits, giving the practical procedures for use in the laboratory.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

For the successful use of this subject should have prior knowledge acquired in the subjects of Electronic Circuits and Electronic and Photonic Devices.

OUTCOMES

1402 - Degree in Telecommunications Electronic Engineering

- G3 - Acquisition of the knowledge of the basic and technological subjects that allows students to learn new methods and theories and endows them with the versatility to adapt to new situations.
- G4 - Ability to solve problems with initiative, decision-making and creativity, and to communicate and transmit knowledge, abilities and skills, understanding the ethical and professional responsibility of the activity of a telecommunications technical engineer.
- G9 - Ability to work in a multidisciplinary environment and in a multilingual group and to communicate, in writing and orally, knowledge, procedures, results and ideas related to telecommunications and electronics.
- G6 - Ability in the handling of specifications, regulations and norms of compulsory compliance.
- TE5 - Ability to design circuits for analog and digital electronics, analog-digital and digital-analog conversion, radio frequency, power and power conversion for telecommunications and computing applications.

LEARNING OUTCOMES

After completing this course, students will be able to:

- Analyze in detail the behavior of any linear analog circuit of medium difficulty (G3,G5).
- Know the different types of devices to address analog electronic design (G3,G6).
- Knowing how to choose the most appropriate type of circuit according to the needs of a design. (G4,TE5).
- To design an electronic system that meets a set of specifications. (G4,TE5).
- Perform the circuit diagram and its simulation. (G4,TE5).

- Proceed with the physical realization of a prototype and testing. (G4,TE5).
- Knowing how to choose the type of amplifier circuit more suitable to the needs of a design. (G4,G6).
- Know linear power design that meets a set of specifications. (G4,G6,TE5).
- Understand in detail the structure of an operational amplifier and the basis of operational design of circuits. (G4,G6,TE5).

DESCRIPTION OF CONTENTS

1. Introduction and basic elements

Item 1. Signals, systems and basic analog components.
1.1. Basic definitions: device, system and signal
1.2. Analog and digital electrical signals
1.3 Specification of a system or electronic circuit
1.4. Basic analog components

2. Amplifiers

Item 2. Transistor signal amplifiers.
2.1. The BJT amplifier
2.1.1. Common emitter amplifier
2.1.2. Common collector amplifier
2.1.3. Common base amplifier
2.2. The FET amplifier
2.2.1. Common source amplifier
2.2.2. Common drain amplifier
2.2.3. Common gate amplifier
2.3. The differential amplifier

Item 3. Frequency response of amplifiers.
3.1. Characteristics of the frequency response of an amplifier
3.2. Model and frequency response of BJT
3.3. Frequency response of amplifiers with common-emitter BJT
3.4. Coupling capacitor

3. Feedback and operational amplifiers

Item 4. Feedback in amplifiers.
4.1. Feedback concept
4.2. Feedback effects on amplification
4.3. Types of feedback

Item 5. The operational amplifier.
5.1. General properties of the operational amplifier

5.2. Inverting amplifier
5.3. Noninverting amplifier
5.4. Limitations of real operational amplifier
5.5. Circuits with operational amplifiers

4. Power supplies

Item 6. Power supplies and regulators.
6.1. Introduction
6.2. Transformers
6.3. Rectification
6.4. Regulators

5. Analog-to-digital and digital-to-analog conversion

Item 7. Analog-to-digital and digital-to-analog conversion.
7.1. Introduction.
7.2. Digital-to-analog converters: types.
7.3. Analog-to-digital converters: types.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Development of group work	20,00	0
Study and independent work	15,00	0
Preparation of evaluation activities	20,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	20,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The methodology is divided into three types of activities. In all cases, the students will have access to teaching materials in advance related to the contents of the course through Virtual Classroom (e-learning platform of the University of Valencia), to facilitate the preparation of classes.

• **Theory classes**. The lectures will develop the issues by providing a global and inclusive vision, analyzing in detail the key and more complex issues. To encourage student participation, lectures will alternate with examples whose resolution will be made jointly by the teacher and students. The teacher can also evaluate the student's prior preparation through issues at the beginning of it.

• **Classes of problems**. In the practical classes will be held discussion sessions and resolution of the most significant problems in each section of the course. Sets of problems will be proposed to be developed in groups, and later exposed by the students. (G9, G4,TE5)

• **Laboratory classes**. In each laboratory class will be assessed both prior preparation of the practice to be performed by verifying the design and simulation of circuits, as the final results. (G9,G4,TE5)

EVALUATION

The course will be evaluated in two models:

A) By assessing the results of continuous assessment:

1. Evaluation of theoretical activity: an examination at the end of the semester will include theoretical and practical issues. Will be valued at 50% of the final grade.
2. Assessment of practical activities (unrecoverable). Be valued with 50% of the final grade:

    - Exhibitions of the work done in groups (20%).
    - Preparation and results of laboratory classes (25%).
    - Regular attendance at classroom activities (5%).

B) For those students who can not attend regularly to classroom activities, the following alternative assessment arises:

1. Evaluation of theoretical activity: an examination at the end of the semester will include theoretical and practical issues. Will be valued at 75% of the final grade.
2. Assessment of practical activities. Will be valued at 25% of the final grade:

- Exhibitions of the work done in groups (10%).
- Preparation and results of laboratory classes (15%).

For the final grade in any of the two modalities is necessary to have a minimum score of four on sections 1 and 2.

REFERENCES

Basic

- Referencia b1: Allan R. Hambley. Electrónica. Pearson Education, 2001.

  Referencia b2: Horowitz-Hill. The Art of Electronics. Cambridge University Press 1989.

  Referencia b3: Espí, Camps, Muñoz. Fundamentos de Electrónica Analógica. Servicio de Publicaciones de la Universidad de Valencia (SPUV), 2006.
  Referencia b4: Espí, Camps, Muñoz. Electrónica Analógica: Problemas y cuestiones. Prentice Hall. Serie Prentice/Práctica, 2006.
  Referencia b5: Documentación preparada por el profesorado para la asignatura, accesible a los alumnos a través de Aula Virtual.

Additional

- Referencia c1: J. Millman y A. Grabel. "Microelectrónica" Ed. Hispano Europea. 1991
  Referencia c2: Enlaces web específicos y aplicaciones de electrónica: empresas del sector y hojas de características de componentes.