VNIVERSITAT DE VALÈNCIA

Course Guide
34814 Analogue Electronics II

COURSE DATA

Data Subject	
Code	34814
Name	Analogue Electronics II
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	3	First 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
SERRANO LOPEZ, ANTONIO JOSE	242 - Electronic Engineering

SUMMARY

The Analog Electronics II course is a course of four months duration, to be conducted in the 5 th quarter of the career, which corresponds chronologically with the first semester of third year. The course is 6 ECTS credits and is included within the electronics field.

The course explores the knowledge and skills of analog electronics that students must acquire to perform their work as an engineer in the company and society. The course extends concepts and skills in analog electronics, such as audio amplifiers.

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 and Analogue Electronics I course.

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.
- G5 - Knowledge to carry out measurements, calculations, assessments, evaluations, loss adjustments, studies, reports, task planning, and other analogous work in the specific field of telecommunications.
- 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).
- Know the different types of active and passive filters existent. (G4,TE5).
- Know choose the type of circuit amplifier more appropriate according to the needs of a design. So much class A, B, AB, C and D. (G4,TE5).

- Knowing how to choose the type of amplifier circuit more suitable to the needs of a design. (G4,G6).

DESCRIPTION OF CONTENTS

1. Síntesis de funciones de red. Filtros.

Impedance synthesis. Active synthesis of impedance. Solving differential equations by analog methods and synthesis of transfer functions from operational. Filters: Butterworth approximations, Chebyshev and Bessel. Frequency transformations. Low pass filters, high pass, band removed, band pass and everything happens. Passive filters. Electronic structures for the design of filters: active filters. Sensitivity of the filters. Practical filters.

2. Electrónica de pulsos

Switches and analog comparators. Sample and hold circuits. Analog comparators. Schmitt trigger. Voltage limiters. Practical circuits

3. Osciladores

Principles of the oscillator. Low Frequency Generators: Wien progressive offset. Other types of function generators and waveform: multivibrator. LC and crystal oscillators.

4. Audio power amplifiers

Extending audio power amplifiers. Different types of amplifiers. Settings in class A, B and AB audio operational amplifiers and feedback. Effects of feedback on the gain. Reduction of nonlinear distortion and noise. Network impedances and practices. Case Studies. Feedback amplifiers. Frequency response and transient response. Feedback and poles. Gain margin and phase. Dominant pole compensation

5. Sesiones de laboratorio.

The Analog Electronics Lab II will consist of six practice sessions three hours each. The equipment needed for each practice is found in the laboratory or the teacher gives it the beginning of practice. The practice statement is available in the virtual classroom.
Session 1: Active filters
Session 2: Comparators
Session 3: Piecewise linear transfer function.
Session 4: Low frequency oscillators.
Session 5: Class AB audio power amplifiers.
Session 6: Class D audio power amplifiers.

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: ApuAllan 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: Muhammad H. Rashid "Circuitos Microeletrónicos: Análisis y diseño". Ed. Thomson. 2002
Referencia c3: Ramakant A. Gayakwad "Op-Amps and Linear Integrated Circuits, 4/e" 2000 ISBN: 0-13-280868-4
Referencia c4: Benhzad Razavi. Design of Analog CMOS Integrated Circuits. McGraw-Hill.
Referencia c5: Enlaces web específicos y aplicaciones de electrónica: empresas del sector y hojas de características de componentes