COURSE DATA

DATA SUBJECT

Code: 34813
Name: Analogue electronics I
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1402 - Degree in Telecommunications Electronic Engineering	Escola Tècnica Superior d'Enginyeria	2	Second quarter, Sin determinar

SUBJECT-MATTER

Degree	Subject-matter	Character
1402 - Degree in Telecommunications Electronic Engineering	Electronics	COMPULSORY

COORDINATION

SUAREZ ALVAREZ ISAAC

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.

COMPETENCES / LEARNING 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.

G6 - Ability in the handling of specifications, regulations and norms of compulsory compliance.

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.

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.

DESCRIPTION OF CONTENTS

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

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

1. Introduction and basic elements

Item 1. Signals, systems and basic analog components.
1.1. Basic definitions: device, system and signal

2. Amplifiers

Item 2. Transistor signal amplifiers.
2.1. The BJT amplifier
2.1.1. Common emitter 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

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	20,00
Independent study and work	15,00
Preparation of lessons	35,00
Preparation for assessment activities	20,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

The teaching methodology is organized in three types of activities. In all cases, the student will have access in advance to the teaching material related to the contents of the subject through the Virtual Classroom (the University of Valencia's e-learning platform), in order to facilitate the preparation of the classes. The content will be based on notes, transparencies and multimedia material, both internal and external, in order to reinforce concepts. The students will have an approximate timing of the development of the subject during the whole term. Attendance to all face-to-face classes will be noted.

• **Theoretical lessons.** In the theoretical classes the topics will be developed providing a global and integrating vision, analyzing with more detail the key and more complex aspects. To encourage student participation, the master classes will alternate with examples to be solved jointly by the teacher and the students. The teacher will also be able to evaluate the student's previous preparation by means of questions at the beginning of the class. Emphasis will also be placed on practical aspects of design and engineering. During the classes and at the end of each topic there will be exercises and questionnaires that can be handed in, both on paper and in digital format.

• **Practical lessons.** In the practical classes there will be sessions of discussion and resolution of the most significant problems of each section of the subject. There will be problem reports that will be developed in groups, with some sessions in class. We will tend to the inverse class methodology. (G9, G4, TE5)

• **Lab classes.** In each laboratory class, both the previous preparation of the practice to be carried out, by checking the design and simulation of the circuits, and the final results will be evaluated. An attendance control will be carried out. (G9, G4,TE5)

EVALUATION

The evaluation of the course, in each of the two official calls, will consist of a part of theory-problems, ETyP, and a part of laboratory, EL, forming between them the final grade, NF. For the positive evaluation of the

subject in any of the two calls, it will be required that the value of NF is at least 5 points out of 10.
The final grade, NF, of the course will be obtained by applying the expression NF = (2/3) x ETyP + (1/3) x EL for students who have obtained a minimum grade of 5 points out of 10 in each of the two parts (ETyP and EL). Students who do not achieve the minimum grade required in one or both of the two parts will have a final value, NF, equal to the lower of the two grades (ETyP and EL).
The evaluation procedure for ETyP and EL is detailed below for each of the two official examinations.
EVALUATION OF THEORY AND PROBLEMS (ETyP):
It will consist with an exam to be held on the date indicated in the official calendar, and will be comprised of a theory part and a part of resolution of one or more problems.
LABORATORY EVALUATION (EL):
The laboratory evaluation may be carried out by two different methods:

- **Continuous evaluation**

Students who attend, at least, 80% of the laboratory classes will be able to make the continuous evaluation of the same by which the laboratory grade will be obtained in the following way:

- Laboratory work, TL, will have a weight of 1/2 of the EL value. For its evaluation, the student will deliver at the end of each practical, a report of the work done in the same, indicating the methodology followed, the results obtained and the answers to the questions that the teacher can formulate throughout the practical. The TL grade will be the average of those obtained in each practical.
- Laboratory test, PL, will have a weight of 1/2 and will be carried out in the last practical session. In order to be able to take the PL, it is considered mandatory to attend at least 80% of the practical sessions, and to have at least a 5 out of 10 in the laboratory work part. Otherwise, the student will lose the right to take the PL and the continuous evaluation will be suspended.

The weighted average of both evaluations will give the value of EL, that is to say:
EL = (1/2) x PL + (1/2) x TL

- **Single evaluation**

Those students who do not take the continuous evaluation, or who have failed it, may take a laboratory exam that will be indicated in the official calendar and that will take place after the ETyP exam. This exam will consist of:

- Hand in all the designs, theoretical calculations and simulations requested in the six practical sessions.
- Do the exam proposed by the professor.

The student who has not passed the course in the first exam will have to take the final exam in the second exam. In this case, if he/she has passed any of the two parts (ETyP and EL), he/she will be able to omit, if he/she wishes, the test corresponding to that part.

In any case, the evaluation system will be governed by the one established in the Reglament de Avaluació i Qualificació de la Universitat de València per a Graus i Màsters (https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdict oSelected=5639).

Copying or plagiarism of any activity that is part of the evaluation will make it impossible to pass the course, and the student will be subject to the appropriate disciplinary procedures indicated in the PROTOCOL OF ACTION AGAINST FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

REFERENCES

- 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.

- 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.