COURSE DATA

DATA SUBJECT

Code: 34935
Name: Analogue electronics systems
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1404 - Degree in Industrial Electronic Engineering	Escola Tècnica Superior d'Enginyeria	3	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	Electronic systems	COMPULSORY

COORDINATION

SUAREZ ALVAREZ ISAAC

SUMMARY

This subject belongs to the matter is Electronic Systems, which is part of the common industrial engineering branch bloc. This subject is lectured in the first quarter of the third year of the Degree of Industrial Electronics Engineering. It has a load of 6 ECTS, which translates into a total workload for the student of 150 hours. 60 hours are in the classroom and 90 hours are individual work of the student. The 6 ECTS are subdivided in 3 ECTS of theory, 1 ECTS of problems solving and 2 ECTS of lab work.

In this subject the student will learn analogue electronic circuits and systems based on the elements seen in previous years (diodes, transistors and opamps). This will allow the student to design more complex electronic systems and know their limitations.

Once the student has passed the subject he will be able to recognise almost all electronic system blocs as well as specify and design them. He will also learn tools to analyse, simulate and understand new blocs

that he has not seen in the subject.

The student will learn basic circuits with transistors, opamps (linear and non linear), filters, oscillators and linear power supplies and regulators.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

It is highly recommendable that the student has passed the subjects of Linear Circuits Theory and Electronic Technology, both belonging to the matter of Principles of Electronics and Electric Technology of the first and second year of the degree. The student has also to master the basic knowledge of mathematics.

COMPETENCES / LEARNING OUTCOMES

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CE2 - Knowledge of the basics and applications of analogue electronics.

CE6 - Ability to design analogue, digital and power electronic systems.

CG3 - Knowledge of basic and technological subjects that allows students to learn new methods and theories and provides them with versatility to adapt to new situations.

CG4 - Ability to solve problems with initiative, decision-making skills, creativity and critical reasoning and to communicate and transmit knowledge, abilities and skills in the field of industrial engineering (with specific industrial electronics technology).

CG6 - Ability to deal with specifications, regulations and mandatory standards.

DESCRIPTION OF CONTENTS

- Signal amplification concepts.
- Frequency response.
- Cascaded amplifiers.

1. Signal amplification

- Signal amplification concepts.
- Frequency response.- The differential amplifier.
- Negative feedback.
- Special stages in integrated amplifiers.

2. Operational Amplifier

- Generalities about the ideal O.A.
- Linear applications of the O.A.
- Non-linear applications of the A.O.
- The real O.A.: deviations.
- Output signal distortion: maximum available amplitude, slew-rate and power bandwidth.
- DC errors.

3. Stability in feedback amplifiers. Oscillators

- Considerations about stability in feedback amplifiers.
- Oscillators: concept and oscillation criteria.
- RC oscillators.
- LC oscillators.
- Timing circuits.

4. Filters

- Passive filters.
- Active filters. Butterworth filter. Other filters.
- Sallen-Key cells. Other configurations.
- RLC selective networks. Application in tuned amplifiers and LC oscillators.

5. Linear power supplies

- Basic concepts about power supplies.
- Linear regulators.
- Design considerations of a linear power supply.

- The differential amplifier.
- The real operational amplifier.
- Linear O.A. applications.
- Simulation and assembly of a Schmitt trigger.

6. Laboratory practices

- The differential amplifier.
- The real operational amplifier.
- Simulation and assembly of a filter.
- Simulation and assembly of an oscillator.

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	0,00
Independent study and work	20,00
Preparation of lessons	55,00
Preparation for assessment activities	15,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

Teaching methodology will be based on problem solving (CG4, CG6, CE6) and lecturing (CG3, CE2), using audio-visual resources. The student will have to work autonomously both alone and in groups.

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&idEdictoSeleccionado=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).

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REFERENCES

- "Electrónica", A. R. Hambley, Ed. Prentice Hall.
- "Principios de Electrónica", A. Malvino, Ed. Mc Graw-Hill.
- "The LTSpice IV Simulator: Manual, Methods and Applications", G. Brocard, Ed. Swiridoff.
- "Fundamentos de Electrónica Analógica", J. Espí, G. Camps, J. Muñoz. Colección: Educació. Materials, nº 94. PUV, Universitat de València.
- "Electrónica Básica para Ingenieros", G. Ruíz-Robredo, J. García-Fernández, Textos Universitarios, Universidad de Cantabria.
- "The Art of Electronics", P. Horowitz, W. Hill, Ed. Cambridge University Press.
- "Foundations of Analog and Digital Electronic Circuits". A. Agarwal, Ed, Elsevier.
- "Amplificadores Operacionales y CI lineales", R.F. Coughlin, F.F. Driscoll, Ed. Prentice Hall.
- "Electronics Circuit SPICE Simulations with LTspice: A Schematic Based Approach (Electronics Circuit Simulations) (Volume 1)", A. Kumar Singh, R. Singh, Ed. CreateSpace Independent Publishing Platform.

- "Aplicaciones de Pspice en ingeniería", J. Espí, Ed. Amazon.
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