COURSE DATA

DATA SUBJECT

Code: 34928
Name: Electronic technology
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	2	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	Foundations of electrotechnics and electronics	COMPULSORY

COORDINATION

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SUMMARY

This 6 ECTS subject belongs to the Basics of Electrical and Electronics matter, which is included within the block Common Industrial Branch, which is given in the Industrial Electronics Degree in the second semester of the second year. The workload for the student is 150 hours over the semester: 60 hours of class lessons and 90 hours are self-organised. The Electronic Technology course share its contents with the Electronic Principles course which is given in the second semester of the first year in the Industrial Electronics Degree.

As expressed in the contents of the degree module: "is the first student contact with the principles and basis of analog electronics. Will analyse the basic concepts of electronic components and circuits and general techniques for analysing them in both time domain and in sinusoidal steady state. The diode, transistor will be described based on semiconductors physics and also its main applications. Finally, will be presented the basic principles of magnetic circuits leading to the transformer as the basis for other electrical machines. It will be explained the basic phenomena of electromechanical energy conversion and the key issues common to rotating machines and it will be explained its functions and construction aspects."

As a part of the matter Fundamentals of Electrical and Electronics, the Electronic Technology course will be

responsible of the contents: semiconductor diode, Bipolar Transistor (BJT), Field Effect Transistor (MOSFET) and its applications.

Apart from purely theoretical contents, the course will provide the student with general knowledge necessary for solving engineering problems. The problem-solving skills will be acquired in the problem sessions of the course, where students must find solutions to problems that requires obtaining several solutions prior to the final result.

On the skills that are required for any engineer, the subject provides the knowledge required for assembly basic circuits on protoboards. Providing students with the skills: component search, schematic circuit understanding, circuits assembly and measurement using laboratory instrumentation, data representation on tables and graphs, and finally the understanding of these data once obtained.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

The backgrounds needed to follow the subject are those acquired in the subjects of mathematics taught in first course and the subject Electronic Principles.

COMPETENCES / LEARNING OUTCOMES

1404 - Degree in Industrial Electronic Engineering

CG11 - Knowledge, understanding and ability to apply the necessary legislation for practising professionally as a qualified industrial engineer.

CG21 - Knowledge and use of the fundamentals of circuit theory and electric machines.

CG22 - Knowledge of the fundamentals of electronics.

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).

CG5 - Knowledge to carry out measurements, calculations, assessments, appraisals, surveys, studies, reports, work plans and analogous work.

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

DESCRIPTION OF CONTENTS

1. The diode

Chapter 1. The diode.
1.1. Diode characteristic.
1.2. Load line analysis.
1.3. The diode model: ideal and real. Small signal.
1.4. Zener diodes.
1.5. Data sheets.
1.6. Applicatons.

2. The bipolar transistor

Chapter 2. The bipolar transistor.
2.1. Types of transistors. Basic operation of the bipolar transistor.
2.2. Common emitter load line analysis.
2.3. Data sheet.
2.4. Large-signal transistor models.
2.5. Bias circuits.
2.6. Small-signal circuits.
2.7. Class A amplifier
2.8. Class AB amplifiers: push-pull.

3. The unipolar transistor: MOS

Chapter 3. Unipolar transistor: MOS.
3.2. Basic operation of the MOSFET transistor.
3.3. Load line analysis
3.4. Bias circuits.
3.5. Data sheet.
3.6. Amplifier circuits
3.7. Small-signal model

4. Lab work

Experiment 1. Junction diode. IV characteristic and its applications. (two sessions)
Experiment 2. BJT output characteristic in common emitter configuration.
Experiment 3. Push-pull amplifier with common emitter driver and direct connection.
Experiment 4 The MOSFET transistor.
Experiment 5. MOSFET transistor amplifier circuits.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	25,00
Laboratory	20,00
Classroom practices	15,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	1,00
Individual or group project	20,00
Independent study and work	0,00
Preparation of lessons	29,00
Preparation for assessment activities	40,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

TECHNICAL LECTURES.

The technical lectures are master classes. During the master class the lecturer will ask some questions to the students to monitor the student progress in its self-organised work previous to each class. The master class will be supported by animated slides to improve the understanding of the abstract concepts involved in the devices junctions. All the support material used in the lectures (slides, papers, web links, bibliography, etc), will be available for the student in Aula Virtual. Aula Virtual is an application developed by the University of Valencia that make easy and direct the access to the different teaching and administrative resources. Competencies CG3, CG4, CG5, CG6, CG11,CG21 and CG22 are worked.

PROBLEM CLASSES.

The problem classes will be in the classroom with a smaller group of students that in the technical lectures. In the problem classes some of the more significant problems that appear in the Problem Sheet will be solved. The problems will be solved in the backboard by the professor or by the students. As in the technical lectures, all the teaching resources will be available in Aula Virtual. Competencies CG3, CG4, CG5, CG6, CG11, CG21 and CG22 are worked.

LABORATORY SESSIONS

The laboratory sessions will be held in the laboratories of the ETSE. During the first half an hour of each laboratory session, the professor will evaluate the student self-organised work about the contents of the scheduled session. This evaluation will be done through some short questions, time scheduled of 15 minutes, or through some individual questions to the students in those groups with fewer

students. Competencies CG3, CG4, CG5, CG6, CG11, CG21 and CG22 are worked.

TUTORIALS

The students have a tutorial timetable to solve problems, doubts, work orientation, etc. The tutorial timetable is set at the beginning of the academic course. Competencies CG3, CG4, CG5, CG6, CG11, CG21 and CG22 are worked.

EVALUATION

THEORY-PROBLEMS EVALUATION.

The theory -problems part can be overcome by two methods, or continuous assessment or a final exam at the end of the semester.

- **Continuous assessment system**. At the end of each chapter there will be a multiple choice test with only theory questions (CG3, CG4, CG5, CG6, CG11, CG21 and CG22). The multiple choice exams will have a 60% on the total rate. The grade of each test will be added to the next to calculate the final grade. No make-up tests are made. If you have chosen the continuous assessment, on the official exam date you will have only a problems exam (CG3, CG4, CG5, CG6, CG11, CG21 and CG22). This exam has a 40% rate on the total mark. To average theory (multiple choice test) and problems the mark must be at least 5 in multiple choice test and 5 in problems test.

There will be a problems test (diodes only) at the end of the first unit of one hour (CG3, CG4, CG5, CG6, CG11, CG21 and CG22). If the mark obtained in this test is greater than 5, until 2 points will be added to the mark obtained in the final problems test (to be held on the official date), if the mark obtained in the final problems test is greater than 4 points.

If first exam notification is failed, the tests made during the year will have a 25% rate on second call (if the average mark of all test is greater than 3, otherwise the second exam notification will be like single assessment system) and problems test will have 75% rate.

- **Single assessment system**. Consist of a final exam that will take place at the end of the semester. This final exam will consist in performing a single test divided into two blocks. The first block with theoretic-practical activities and the second block will correspond to problems (CG3, CG4, CG5, CG6, CG11, CG21 and CG22). The average of the qualifications of the two thematic blocks will be considered only if both blocks have been passed.

It is mandatory to pass both blocks with a mark over 5.

Students who have choose, **from the beginning of the course,** the single assessment system should inform

personally to the professor in charge.

LABORATORY EVALUATION.

The evaluation of the laboratory will be done, as in theory problems part, by two methods continuous assessment and final exam.

- **Continuous assessment system**. It is mandatory the attendance to all laboratory classes to pass the laboratory evaluation by using the continuous assessment system. Continuous assessment during the course will take into account the average grade obtained in the resolution of the laboratory handout and the grade obtained on the test prepared by the teacher previous to the resolution of the practice (with a rate of 50% and 20% respectively) and the work done by the student during the lab sessions (20%). (CG3, CG4, CG5, CG6, CG11, CG21 and CG22). This continuous assessment will be the 100% of the laboratory mark session (CG3, CG4, CG5, CG6, CG11, CG21 and CG22). The mark on each part must be over 4.
- **Single assessment system: the final exam.** It consists of a laboratory final exam the same day scheduled for the final exam of theory-problems (CG3, CG4, CG5, CG6, CG11, CG21 and CG22). Students who have choose,**from the beginning of the course,** the single assessment system will also have to submit all the reports asked by the professor.

To pass the laboratory evaluation using continuous assessment system, the student should obtained grades higher than five in (n-1) on the laboratory sessions and in (n-1) of the tests made by the teacher previous to each laboratory session. Being n the number of laboratory sessions.

The student who has chosen from the beginning of course continuous assessment and has not succeeded the laboratory assessment has to do the final laboratory exam. The mark obtained in this exam will be the laboratory mark.

Students who have choose **from the beginning of the course** the single assessment system should inform personally to the professor in charge.

COURSE EVALUATION.

The theory-problems rate is the 70% of the final mark and laboratory rate is the 30% in the final mark, being indispensable to pass both parts.

The composition of the final grade for the course for continuous assessment system and single assessment system can be seen in the next tables.

- ***Continuous Assessment System***

Summary of the composition of the final grade for the Course

Activities or Concepts to evaluate	Assessment Method	Partial Assessment %	Final Assessment %
First announcement Theory-Problems	a) Test b) Problems	60% 40%	70%
Second announcement Theory-Problems	a) Test b) Problems	25% 75%	70%
Laboratory sessions	1) Previous issues 2) Handouts 3) Individual exam	30% 50% 20%	30%
TOTAL			**100%**

To average theory (multiple choice test) and problems the mark must be at least 5 in multiple choice test and 5 in problems test.

The student who has chosen from the beginning of course continuous assessment and has not succeeded the laboratory assessment, has to do the final laboratory exam. The mark obtained in this exam will be the laboratory mark.

The work of each laboratory area must be over 4 to average with the other issues.

Students who have choose **from the beginning of the course** the single assessment system should inform personally to the professor in charge.

- ***Single Assessment System***

Summary of the composition of the final grade for the Course

Activities or Concepts to evaluate	Assessment Method	Final Assessment %
Theory-Problems	a) Theóretic-practical activities	45%
	b) Problems	25%
Laboratory sessions	1) Laboratory final exam	20%
	2) Submitted reports	10%
TOTAL		**100%**

The final exam is divided into two blocks (theoretic-practical activities and problems). The average of the qualifications of the two blocks will be considered only if both blocks have been passed

In any case, the evaluation system will be governed by that 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 result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

REFERENCES

- Electrónica. A.R. Hambley. Ed. Prentice-Hall International, Inc. 2001, 2ª Edición, ISBN 84-205-2999-0.
- Microelectrónica: Circuitos y Dispositivos. M.N. Horenstein. Prentice-Hall Hispanoamericana, S. A., 2ª Edición, ISBN 968-880-707-9.

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- Principios de Electrónica. A. Malvino, D. J. Bates, Ed. McGraw-Hill 2007, 7ª Edición, ISBN 978-84-481-5619-0.
- Semiconductor Devices. Kanaan Kano. Ed. Prentice-Hall International, Inc. 1998, 1ª edición, ISBN 0-02-361938-4
- Electronic Devices, Discret and Integrated, S.R. Fleeman, Ed. Prentice-Hall, 1990, ISBN 0-13-336181-0.
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