

Degree programme	Type	Course
Computer Engineering	FB	1

Contact lecturer

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Group languages

You can consult this information at the [end](#) of the document.

Prerequisites

The student must be able to demonstrate proficiency in the following mathematical concepts:

- Trigonometric, exponential, and logarithmic functions.
- Graphical representation and analysis of functions.
- Differentiation and integration of functions.
- Manipulation and operations involving complex numbers.

Objectives

- Understand the fundamental concepts of electricity and electronics, including electric current, voltage, power, and energy.
- Identify the basic components of electrical and electronic circuits, such as voltage sources (batteries), resistors, cables, capacitors, and inductors.
- Apply the laws of circuit analysis to determine the behavior of linear electrical circuits.
- Analyze the transient response of electrical circuits containing energy-storage elements such as capacitors and inductors.
- Analyze the frequency response of electrical circuits containing capacitors and inductors, and solve electrical circuits excited by sinusoidal signals.
- Understand the physical principles underlying the behavior of semiconductor devices.
- Understand the operating principles of field-effect transistors and their basic digital applications,

including logic gates and memory circuits.

Learning outcomes

- KM04 (Define the basic concepts of electrical circuit theory and electronic circuits.) Define the basic concepts of electrical circuit theory and electronic circuits.
- KM05 (Identify the basic designs to implement logic gates and memory cells for processing and storing digital information.) Identify the basic designs to implement logic gates and memory cells for processing and storing digital information.
- SM06 (Apply knowledge of electrical and electronic circuits to solve general computer engineering problems.) Apply knowledge of electrical and electronic circuits to solve general computer engineering problems.
- SM07 (Analyse theoretically first-order electrical circuits in continuous operation, both transient and permanent, with the help of computer-aided simulation.) Analyse theoretically first-order electrical circuits in continuous operation, both transient and permanent, with the help of computer-aided simulation.

Contents

1 - Introduction to electronic circuits. Basic concepts of field, electromagnetism and electricity. Basic elements: voltage and current sources, resistors, capacitors and coils. Power and energy.

2 - Basic laws of circuit analysis. Linear circuits. Resolution of simple circuits with Kirchhoff laws. Other methods: superposition principle, Thevenin and Norton theorems.

3 - Temporary evolution: Transient regime. First order circuits and resolution techniques. Examples of RC and RL circuits, among others. Determination of the initial conditions and steady state of a circuit before and after a transient stage.

4 - Permanent sinusoidal regime. Introduction to the permanent regime. Definition of the sinusoidal signal. Introduction to complex notation and definition of the concept of impedance. Determination of the transfer function of a circuit. Study of the frequency response of a circuit. First order filters.

5 - Introduction to Semiconductors and PN junction diodes.

6 - Logic gates with MOSFET field effect transistors. Structure and types of transistors. I-V curves and operating regions. Digital applications. Memories and logic gates.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Searching of information	8	0.32	KM04, KM05, SM06
Resolution of problems (individual or small groups)	20	0.8	KM04, KM05, SM06, SM07
Problems resolution under the lecturer supervision	3	0.12	KM04, KM05, SM06
Lab sessions	12	0.48	KM04, KM05, SM06, SM07
practical session in the classroom	12	0.48	KM04, KM05, SM06
Theoretical lessons	26	1.04	KM04, KM05, SM06
Previous report of lab sessions	12	0.48	KM04, KM05, SM06, SM07
Individual study	35	1.4	KM04, KM05, SM06, SM07

During the semester, face-to-face lectures, problem-solving sessions, and practical classes will be conducted.

- Lectures: During the lectures, the scientific and technical concepts of the course will be presented in a structured, clear, and organized manner. Students will be introduced to the fundamental concepts and provided with guidance to further develop and deepen their understanding of the course content.
- Problem-solving sessions: These sessions will focus on the practical application of the concepts through the solution of exercises and problems. In addition, one or more individual and/or group activities will be carried out during the semester. These activities will be assessed and taken into account in the final course grade.
- Practical sessions: During the practical classes, conducted in small groups, students will solve problems related to the topics covered in the lectures, with the support and supervision of the instructor. The objective is to consolidate and deepen students' understanding of the course content. Laboratory sessions are mandatory. The laboratory schedule will be published on the Virtual Campus at the beginning of the semester. Their objective is to promote active learning through the implementation, assembly, and measurement of basic electronic circuits, while developing competencies such as critical thinking, analytical skills, and teamwork.

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Activities carried out in supervised sessions	12	4	0.16	KM04, KM05, SM06
theoretical-practical test	58	6	0.24	KM04, KM05, SM06
Evaluation of work carried out and presented by the student	30	12	0.48	KM04, KM05, SM06, SM07

A. Three types of assessment:

1. Assessment through individual theory examinations

The course assessment will include two individual midterm examinations conducted during the semester. Each examination will account for 29% of the final grade (58% in total). A minimum score of 3.0 must be obtained in each examination, and a minimum average score of 5.0 is required to pass this assessment component.

2. Assessment of activities carried out in supervised group sessions

Assessment will include group problem-solving activities supervised by the instructor during the face-to-face sessions throughout the semester. These activities will account for 12% of the final grade. No minimum mark is required for this assessment component.

3. Assessment of laboratory work

Laboratory sessions are mandatory. During each laboratory session, students working in groups must complete a questionnaire, which will be assessed by the instructor. The only exception is the SPICE simulation sessions, for which a laboratory report must be submitted at the beginning of the following laboratory session.

The laboratory assessment, which is not recoverable, accounts for 30% of the final grade. A minimum mark of 5.0 is required for this component to be included in the final course assessment.

Students repeating the course who have successfully completed the laboratory sessions during any of the

previous three academic years will not be required to repeat them, and their previous laboratory grade will be retained.

Students must present a valid national identity card (DNI) or an equivalent official identification document in order to sit any examination.

B. Procedure for determining the final grade

- If the minimum mark has been achieved in assessment components 1 (individual theory examinations) and 3 (laboratory work), the final course grade will be calculated by applying the corresponding weighting to each assessment component.
- If the minimum mark is not achieved in the individual theory examinations, or if the overall final grade is below 5.0, students will be entitled to a resit examination, provided that they have completed and passed the laboratory sessions. The resit examination will cover the entire course syllabus and will account for 70% of the final grade. It will assess both assessment component 1 (individual theory examinations) and assessment component 2 (activities carried out in supervised group sessions). A minimum mark of 5.0 must be obtained in the resit examination in order for this mark to be averaged with the remaining assessment components.
- If the minimum mark required in any of the assessment components is not achieved, the course will not be considered passed. In this case, if the mark obtained in assessment component 1 (individual theory examinations) is below 5.0, this mark will become the final course grade. If this mark is 5.0 or higher, the final course grade will be 4.5.
- This course does not offer a single-assessment option.
- For each assessment activity, the date, time and location of the review session will be announced. During this session, students may review their assessed work with the instructor and submit grade appeals, which will be considered by the teaching staff responsible for the course. Students who do not attend the scheduled review session will not be entitled to request a subsequent review.
- The award of Honours (Matrícula de Honor) is at the discretion of the teaching staff responsible for the course. According to UAB regulations, this distinction may only be awarded to students who obtain a final grade of 9.0 or higher. The number of honours awards may not exceed 5% of the total number of enrolled students.
- A final grade of "Not Assessed" will be awarded only to students who have not taken either of the individual theory examinations (assessment component 1) nor the resit examination.
- The dates of continuous assessment activities and assignment submissions will be published on the Virtual Campus. These dates may be modified for organisational reasons or due to unforeseen circumstances. Any changes will be communicated through the Virtual Campus, which is considered the official communication platform between the teaching staff and students.
- Without prejudice to any additional disciplinary measures that may apply under current academic regulations, any academic misconduct committed by a student (see Section C below) that may affect the outcome of an assessment activity will result in a grade of zero for that activity. Assessment activities graded in this manner cannot be recovered. If passing such an activity is required to pass the course, the student will automatically fail the course, with no possibility of recovering it during the same academic year.

C. Academic misconduct that may result in failing the course

The following, among others, will be considered academic misconduct:

- copying all or part of a laboratory exercise, report, or any other assessment activity;
- allowing another student to copy;
- submitting group work that has not been entirely produced by the members of the group;

- submitting as one's own work materials prepared by third parties, including translations or adaptations, or, in general, any work containing material that is neither original nor produced by the student;
- having communication devices (mobile phones, smartwatches, etc.) accessible during individual theory examinations;
- talking to other students during individual theory examinations;
- copying or attempting to copy from another student during individual theory examinations;
- using or attempting to use notes or any other course-related material during individual theory examinations when such material has not been explicitly authorised.

In future editions of the course, students who have committed academic misconduct in an assessment activity will not receive credit for any assessment components previously passed.

In summary, copying, allowing others to copy, plagiarism, or attempting any of these actions in any assessment activity will result in a fail for the course. This failure cannot be compensated, and no assessment components will be recognised in future editions of the course.

If a student fails the course as a consequence of academic misconduct, the numerical grade recorded in the academic transcript will be the lower of 3.0 or the average mark obtained in the individual theory examinations. Consequently, the course cannot be passed by compensation.

D. Use of Artificial Intelligence

The use of Artificial Intelligence (AI) technologies is not permitted in any assessment activity of this course. Any work containing material generated using AI tools will be considered a breach of academic integrity and may result in a partial or total penalty in the assessment grade, as well as additional disciplinary sanctions in more serious cases.

Bibliography

Bibliography:

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- J. Millman. Microelectrónica. Circuitos i sistemes analògics i digitals. Hispano europea. 1991
- L. Prat i altres, Circuitos y dispositivos electrónicos. Fundamentos de Electrónica. Edicions UPC. 1999

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- C.A. Holt, Circuitos electrónicos digitales y analógicos. Reverté, 1985.
- A.R. Hambley, Electrónica, Prentice Hall.
- M.H. Rashid, Circuitos microelectrónicos, Thomson, 2002
- R.E. Thomas i A.J. Rosa, Circuitos y señales, Reverté.

Software

In some laboratory sessions PSPICE and KiCad will be used.

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	41	Catalan	second semester	morning-mixed
(TE) Theory	43	Catalan	second semester	morning-mixed
(TE) Theory	45	Spanish	second semester	morning-mixed
(PAUL) Classroom practices	411	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	411	English	second semester	morning-mixed
(PAUL) Classroom practices	412	Spanish	second semester	morning-mixed
(PLAB) Practical laboratories	412	English	second semester	morning-mixed
(PLAB) Practical laboratories	413	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	414	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	415	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	416	Spanish	second semester	morning-mixed
(PLAB) Practical laboratories	417	Spanish	second semester	morning-mixed
(PLAB) Practical laboratories	418	Catalan/Spanish	second semester	morning-mixed
(PLAB) Practical laboratories	419	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	420	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	421	Catalan	second semester	morning-mixed
(PAUL) Classroom practices	431	Spanish	second semester	morning-mixed
(PAUL) Classroom practices	432	Catalan	second semester	morning-mixed
(PAUL) Classroom practices	451	Catalan	second semester	morning-mixed

(PAUL) Classroom practices	452	Catalan	second semester	morning-mixed
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