SUBJECT TEACHING GUIDE

G867 - Circuit Theory II

Degree in Electrical Engineering
First Degree in Electrical Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Electrical Engineering First Degree in Electrical Engineering			Type and Year	Compulsory. Year 2 Compulsory. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Further Circuit Theory Further Module in Common with the Industrial Branch				
Course unit title and code	G867 - Circuit Theory II				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ELECTRICA Y ENERGETICA
Name of lecturer	CARMELA ORIA ALONSO
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Other lecturers	ALFREDO ORTIZ FERNANDEZ CARLOS LIAÑO FERNANDEZ

3.1 LEARNING OUTCOMES
- Solve first-order transient circuits, representing voltages and currents.
- Determine and analyze the operating modes of second-order circuits in the time domain.
- Apply Laplace transform to the analysis of circuits in transient state.
- Understand the concept of a quadripole and its applications in the study of electrical and electronic systems. Identify different association methods and calculate the parameters of the resulting quadripole . Determine image parameters.
- Apply Fourier series to the analysis of circuits with non-sinusoidal periodic excitations.
- Know how to use the LTspice tool for the simulation and resolution of circuits in any operating mode.

4. OBJECTIVES
Solve electrical circuits in any operating mode using the most appropriate method.
Equip students with a set of analysis techniques that enable easy understanding, resolution, and utilization of electrical systems.
Provide a set of concepts, methods, and tools that are flexible enough to be utilized in other courses within the field of specialization.

6. SUBJECT PROGRAM	
CONTENTS	
1	TRANSIENT REGIME CIRCUITS I: Introduction. Transient regimes in first-order circuits with a single energy storage element and DC excitation. Transient regimes in first-order circuits with a single energy storage element and sinusoidal AC excitation. Transient regimes in first-order circuits with multiple energy storage elements.
2	TRANSIENT REGIME CIRCUITS II: Transient regimes in second-order circuits without external excitation and with sources. Transient response in circuits with multiple loops. Application of Laplace Transform to the analysis of circuits in transient state.
3	QUADRIPOLES: Introduction. Concept of a quadripole. Parameters of a quadripole. Association of quadripoles. Image parameters.
4	ANALYSIS OF CIRCUITS IN NON-SINUSOIDAL REGIME: Introduction. Values associated with non-sinusoidal periodic functions. Analysis of networks with non-sinusoidal periodic excitation. Power and theorems.
5	Simulation Practices with LTspice and Laboratory Practices for the Subject.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
First partial exam	Written exam	No	Yes	45,00
Second partial exam	Written exam	No	Yes	45,00
Continuous assessment activities	Work	No	No	10,00
TOTAL				100,00
Observations				

Students can pass the course in two ways:

1. CONTINUOUS EVALUATION

Students must achieve a minimum average grade of 5 out of 10 in both partial exams and continuous assessment.

- First partial exam, P1:
A written exam covering lessons 1 and 2, conducted halfway through the semester. The minimum grade to compensate with the rest of the grades will be 4/10. This exam can be retaken in the regular and/or extraordinary sessions, on dates set by the center's administration.

- Second partial exam, P2:
A written exam covering lessons 3, 4, and 5 (laboratory practices), conducted in the ordinary session. The minimum grade to compensate with the rest of the grades will be 4/10. This exam can be retaken in the extraordinary session, on a date set by the center's administration.

- Continuous assessment activities, CA:
To perform these continuous assessment tasks, attendance of at least 80% of the in-person activities of the subject is required. Positive attendance evaluation will consider aspects such as attitude and active participation in class, problem-solving, timely submission of assigned tasks, etc. Specifically, written assignments, problem-solving, Moodle quizzes, laboratory practice reports, etc., may be requested. No minimum grade is required for these activities. The activities proposed will fit into the temporal planning of teaching the subject and aim to encourage active participation and engagement of students in in-person activities throughout the semester. Due to their nature, these activities will not be recoverable.

The weighted average grade of students who follow the continuous assessment of the subject will be calculated as: $0.45 \cdot P1+0.45 \cdot P2+0.10 \cdot CA$.

If the minimum required grade is not reached in the partial exams (P1 or P2), the grade will be the lowest grade between the weighted average grade and 4.9.

2. FINAL EVALUATION

Students who have not followed continuous assessment and have attended less than 80% of in-person activities may take the partial exams of the subject P1 and P2, under the same conditions as students following continuous assessment. However, they will not be able to score in the continuous assessment section.

In the ordinary session, their grade will be calculated with the expression: $0.45 \cdot P1+0.45 \cdot P2$, and to pass, they must achieve a grade greater than or equal to 5 with that expression.

In the extraordinary session, they can obtain 100% of the grade without the need to perform continuous assessment activities, and their grade will be calculated with the expression: $0.5 \cdot P1+0.5 \cdot P2$.

To pass the subject through final evaluation, a minimum grade of 4/10 must also be obtained in each partial (P1 and P2), and a weighted average grade equal to or greater than 5/10 with the aforementioned expressions.

COMPUTER AND LABORATORY PRACTICES: Attendance to at least 80% of the computer practice hours and experimental laboratory practices is mandatory to pass the course, both for students who follow continuous assessment and those who opt for the final assessment. The practices will be evaluated through questions in the exams, and submission of assignments or reports may also be required (counted within the continuous assessment activities of the subject).

Remote evaluation of assignments, laboratory practical exercises, and written tests is envisaged in case of a new COVID-19 health alert making it impossible to carry out the evaluation in person.

Observations for part-time students

The evaluation will be conducted with the same criteria as full-time students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
SÁNCHEZ, P.; CAVIA, M.A.; ORTIZ, A.; MAÑANA, M.; EGUÍLUZ, L.I.; LAVANDERO, J.C. “Teoría de circuitos: problemas y pruebas objetivas orientadas al aprendizaje”. Pearson Educación. 2007.
EGUÍLUZ, L.I.; SÁNCHEZ, P.; CAVIA, M.A.; LAVANDERO, J.C. "Pruebas Objetivas de Circuitos Eléctricos". EUNSA.
PASTOR, A.; ORTEGA, J.; PARRA, V.; PÉREZ, A. "Circuitos Eléctricos". Volumen I. UNED.
PASTOR, A.; ORTEGA, J. "Circuitos Eléctricos". Volumen II. UNED.
BOYLESTAD, R.L. “Análisis Introductorio de Circuitos”. Pearson Educación.
IRWIN, D.J. “Análisis Básico de Circuitos en Ingeniería”. Prentice Hall.
Materiales teórico-prácticos de la asignatura proporcionados por el profesor.