UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course:	CIRCUIT THEORY	**Code:**	56405
Type:	CORE COURSE	**ECTS credits:**	6
Degree:	412 - UNDERGRADUATE DEGREE PROGRAMME IN ELECTRICAL ENGINEERING	**Academic year:**	2023-24
Center:	106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING	**Group(s):**	55
Year:	2	**Duration:**	C2
Main language:	Spanish	**Second language:**	
Use of additional languages:		**English Friendly:**	Y
Web site:		**Bilingual:**	N

Lecturer: **RAQUEL JURADO MERCHAN** - Group(s): **55**

Building/Office	Department	Phone number	Email	Office hours
Edificio Störr, 3º planta, Dpto. IEEAC	INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES	926052772	raquel.jurado@uclm.es	The consultation hours for doubts will be set at the beginning of the semester.

2. Pre-Requisites

Students must have the ability to solve mathematical problems that may arise in engineering and the aptitude to apply knowledge of linear algebra, differential geometry, differential and integral calculus and differential equations. They must also understand the basic concepts of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism, and their application to the resolution of engineering problems. It is also advisable to have previously taken the subject of Electrical Technology.

3. Justification in the curriculum, relation to other subjects and to the profession

The subject Circuit Theory is a natural continuation of the subject Electrical Technology and its related competence in the principles of circuit theory and electrical machines. It serves as a basis for other subjects in which a knowledge of dynamic circuit analysis is necessary and introduces the principles of electrical machines.
The mathematical tools studied in this subject, although specialised in the study of circuits, are of general application in the analysis of dynamic systems of any kind and, therefore, this subject is of great interest and usefulness for the future graduate.

4. Degree competences achieved in this course

Course competences

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CEC04	Knowledge and use of the principles of circuit theory and electrical machines.
CEE01	Ability to design and calculate electrical machines.
CG03	Knowledge of basic and technological subjects to facilitate learning of new methods and theories, and provide versatility to adapt to new situations.
CG04	Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering.
CT01	Knowledge of a second language.
CT02	Knowledge and application of information and communication technology.
CT03	Ability to communicate correctly in both spoken and written form.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Ability to analyse circuits in the presence of periodic signals.

Ability to analyse the frequency response of circuits.Ability to analyse the frequency response of circuits.

Knowledge of the fundamentals of symmetric component theory.

Knowledge of the fundamentals of symmetric component theory.

Ability to apply the Laplace transform to circuit analysis.
Ability to determine the time response of circuits. Ability to determine the time response of circuits.

6. Units / Contents

Unit 1: TIME-DOMAIN CIRCUIT ANALYSIS
Unit 2: APPLICATIONS OF THE LAPLACE TRANSFORM TO SOLVING CIRCUITS
Unit 3: APPLICATIONS OF FOURIER ANALYSIS TO CIRCUIT RESOLUTION
Unit 4: FREQUENCY RESPONSE ANALYSIS. FILTERS
Unit 5: SYMMETRIC COMPONENT THEORY

ADDITIONAL COMMENTS, REMARKS

Laboratory practicals:

Practical 1: Computational tools for circuit analysis.

Practical 2: Study of the time response in first order circuits.

Practical 3: Study of the time response in circuits with successive switching.

Practice 4: Study of the time response in second order circuits.

Practice 5: Applications of Fourier analysis.

Practice 6: Study of frequency response.

Practice 7: Fundamentals of symmetrical components.

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7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Combination of methods	CB01 CB05 CEC04 CEE01 CG03 CT01	1.2	30	N	-	Presentation and development of fundamental theoretical concepts.
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CB01 CB02 CB03 CB04 CB05 CEC04 CG03 CG04 CT03	0.4	10	N	-	Resolution of exercises by the teacher that illustrate the theoretical contents discussed above.
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB01 CB02 CB03 CB04 CB05 CEC04 CG03 CG04 CT01 CT02 CT03	0.6	15	Y	Y	They will consist of small groups of practical exercises that will help to resolve any doubts that may have arisen both in the theoretical concepts and in the resolution of problems. To support the resolution process, it will be complemented with the use of specific software that will allow both the simulation of the proposed circuits and the use of mathematical tools that will speed up the resolution of the practical cases. Attendance at these group tutorial sessions will be compulsory, and students will be required to submit a report of the activities carried out during these sessions.
Formative Assessment [ON-SITE]	Assessment tests	CB01 CB02 CB04 CB05 CEC04 CG03 CG04 CT03	0.2	5	Y	Y	Written tests to evaluate the theoretical and practical contents developed in the course.
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CEC04 CEE01 CG03 CG04 CT01 CT02 CT03	3.6	90	N	-	
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
			Students must solve the proposed exercises analytically and/or by means of simulation and hand in the resolution in due time and form. As this is a compulsory activity, students must achieve a

Laboratory sessions	30.00%	30.00%	minimum of 40% of their grade in order to pass the course. This activity can only be recovered when, for duly justified reasons, the teacher deems it necessary to extend the deadline or to take a practice exam. These recoveries will only be allowed if the student has achieved the minimum grade required in the rest of the evaluable activities (partial tests or final exam). The grade will not be retained for subsequent academic years.
Mid-term tests	70.00%	0.00%	They will consist of two tests related to both theoretical aspects and practical application. Passing them will require at least 40% of the maximum mark in each of the mid-term exams. They will be of an eliminatory nature. If the average mark between the mid-term exams passed is equal to or higher than 4 points out of 10, the practical grade will be taken into account and the course will be passed if the mark obtained is higher than 5 points.
Final test	0.00%	70.00%	It will consist of a test related to both theoretical aspects and practical application, which will be structured as two partial tests. Passing the test will require achieving at least 40% of the maximum mark in each of the parts into which it is divided. If the average mark between the parts passed is equal to or higher than 4 points out of 10, the practical grade will be taken into account and the subject will be passed if the mark obtained is higher than 5 points.
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

Students will have two mid-term exams which will be eliminatory, i.e. if they pass a mid-term they will not have to sit the final exam.
In order to pass the course in the ordinary exams, a minimum of 40% of the maximum grade must be obtained in each of the mid-term exams and in the practicals, all of which are compulsory activities.
If this requirement is not met, even if the overall grade of the subject after the weighted average of all the evaluable parts is higher than 5 out of 10, the grade in the minutes will be Fail (4). In the event that the weighted average does not reach 4, the grade will be that obtained from the weighted average of all the activities.
The recovery of the partial tests will be possible in the final exam, while the recovery of the practicals will be possible as detailed in the previous description.
During the partial or final exams it is strictly forbidden to use any kind of electronic device (mobile phones, tablets, smartwatches, etc.), even if they are switched off.
In case of non-compliance with this rule, the grade will be Fail (0), even if the terminal is switched off. This rule is applicable to all exam sessions.

Non-continuous evaluation:

For students who do not take part in non-continuous assessment, the criteria will be the same as for continuous assessment, except that the part of the assessment corresponding to the partial tests will be examined in a single final exam which will be structured as two partial tests and which will be subject to the same criteria as those established for the partial tests of continuous assessment.
Passing the practicals is also compulsory and is subject to the same criteria as for the continuous assessment.

Specifications for the resit/retake exam:

In the extraordinary exam session, the same criteria will be followed as in the ordinary exam session.

Specifications for the second resit / retake exam:

In the special final exam session, the same criteria will be followed as in the ordinary exam session.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	30
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	10
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Formative Assessment [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90

Global activity

Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	30
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	10
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Formative Assessment [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house Citv	ISBN	Year	Description
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FRAILE MORA, JESÚS.	Electromagnetismo y Circuitos Eléctricos. (4ª Ed.).	Mc Graw Hill		2005
GARCÍA BREIJÓ, E y 2 más.	PSPICE.	Paraninfo.		1995
GONZÁLEZ, B.	Sistemas Polifásicos.	Paraninfo.		1994
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HAYT, W.	Análisis de Circuitos en Ingeniería.	Mc. Graw Hill.		
MARTÍNEZ MARTÍNEZ, JUAN ANTONIO	Teoría de Circuitos II (Apuntes)			2000
NILSSON, J.W. & Riedel, S.A.	Circuitos Eléctricos.	Pearson.		2005
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PASTOR, A., y otros	Circuitos Eléctricos (Vol. 1).	UNED		2003
RAS, E.	Teoría de Circuitos: Fundamentos.	Marcombo.		1977
ROEPER.	Corrientes de Cortocircuito en Redes Trifásicas.	Marcombo.		
ROSSA, T.	Circuitos y Señales.	Reverté.		1991
ALEXANDER C.K., SADIKU M.N.O.	Fundamentos de Circuitos Eléctricos	Mc. Graw Hill	Madrid	2022