1. BASIC INFORMATION

Course	Circuit Analysis
Degree program	Bachelor's Degree in Computer Engineering
School	School of Architecture, Engineering and Design
Year	Second
ECTS	6 ECTS
Credit type	Basic
Language(s)	English/Spanish
Delivery mode	Campus-based / Online
Semester	Fourth semester
Academic year	2024-2025
Coordinating professor	Mª José Terrón López
Professor	Silvia Abad, Mª José Terrón López

2. PRESENTATION

This course belongs to the Subject "Physics" made up of the following Basic subjects:

- FUNDAMENTALS OF PHYSICS FOR ENGINEERING 6 ECTS (1st year)
- CIRCUIT ANALYSIS 6 ECTS (2nd year)

In the "Circuit Analysis" course students make their first approach to electrical and electronic circuits. The importance of the subject within the curriculum is to provide students with the theoretical concepts and laws that govern Circuit Theory and Electronics.
This lays the foundation for circuit analysis: voltage, current, and power calculations and circuit analysis methods, both direct current (DC) and alternating current (AC).
Likewise, basic knowledge of electronics and electronic devices is acquired. This will allow the interpretation and understanding of analogue circuits and digital technologies, necessary for other subjects of digital electronics and interconnection of integrated circuits and peripherals.
The aim is for the student to be able to identify and learn the basic functioning of different electronic components and circuits. At the same time, the student must also be able to simulate the behavior of the different study circuits using computer tools.

3. COMPETENCIES AND LEARNING OUTCOMES

Core competencies:

- CB4 - Students are able to transmit information, ideas, problems and solutions to both a specialized and non-specialized audience.

General competencies:

- CG08: Knowledge of basic subjects and technologies, which enable them to learn and develop new methods and technologies, as well as those that provide them with great versatility to adapt to new situations

- CG10: Knowledge for carrying out measurements, calculations, valuations, appraisals, studies, reports, task planning and other similar computer work

Cross-curricular competencies:

- CT4. Ability to analyze and synthesize: to be able to break down complex situations into their constituent parts; also evaluate other alternatives and perspectives to find optimal solutions. Synthesis seeks to reduce complexity in order to better understand it and/or solve problems.
- CT6: Oral communication/written communication: ability to transmit and receive data, ideas, opinions and attitudes to achieve understanding and action, being oral that which is carried out through words and gestures and written, through writing and/or graphic supports.

Specific competencies:

- CE2. Understanding and mastery of the basic concepts of fields and waves and electromagnetism, theory of electrical circuits, electronic circuits, physical principle of semiconductors and logical families, electronic and photonic devices, and their application to the resolution of engineering problems.

Learning outcomes:

- Understand the basics of electric circuit theory in DC and AC.
- Analyze DC and AC circuits.
- Calculate transients.
- Use the basic concepts of linear systems, Laplace and Fourier functions and transforms.
- Apply the knowledge acquired to solve problems of circuits with resistors, capacitors, inductors and transformers and other electronic devices with initiative and decision-making.
- Use signal filtering.

The table below shows the relationship between the competencies developed in the course and the learning outcomes that are pursued:

Competencies	Learning Outcomes
CB4, CG8, CG10, CT4, CT6, CE2	Understand the basics of electric circuit theory in DC and AC.
CB4, CG8, CG10, CT4, CT6, CE2	Analyze DC and AC circuits
CB4, CG8, CG10, CT4, CT6, CE2	Calculate transients.
CB4, CG8, CG10, CT4, CT6, CE2	Use the basic concepts of linear systems, Laplace and Fourier functions and transforms.
CB4, CG8, CG10, CT4, CT6, CE2	Apply the knowledge acquired to solve problems of circuits with resistors, capacitors, inductors and transformers and other electronic devices with initiative and decision-making.
C CB4, CG8, CG10, CT4, CT6, CE2	Employ Signal Filtering

4. CONTENTS

The content of the course is divided in four main blocks:

- Analysis and theory of electrical circuits

- Materials technology. Introduction to semiconductors.
- Electronic and photonic devices
- Logical families

These will be dealt with in greater depth in the following learning units (UA):

UA 1: Basic Concepts of DC Electrical Circuits.
UA 2: Basic Concepts of Electrical Circuits in AC.
UA 3: Semiconductors and Diodes
UA 4: Op-Amps
UA 5: Bipolar and field-effect amplifiers
UA 6: Introduction to digital electronics. Digital Logic Families

5. TEACHING-LEARNING METHODOLOGIES

The following are the types of teaching-learning methodologies that will be applied:

- Survey of objectives and interests.
- Master class, study topics and seminars.
- Laboratory practices.
- Group Troubleshooting
- Field experiences, conferences, visits to companies and institutions.

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based modality:

Learning activity	Number of hours
AF1: Master classes, reading of main topics and complementary materials, carrying out individual and collaborative application activities	50 h
AF2: Group work of an integrative nature	25 h
AF3: Autonomous work	50 h
AF4: Tutorials, academic monitoring and evaluation	25 h
TOTAL	**150 h**

Online modality:

Learning activity	Number of hours
AF3: Autonomous work	50 h
AF6: Individual reading of complementary topics and materials and carrying out individual application activities. Subsequently,	50 h

asynchronous group debate via forum on the Virtual Campus, and virtual seminar with the synchronous e-learning tools of the Virtual Campus.	
AF7: Group work of an integrative nature, which consists of participation in debates and seminars, and the carrying out of group activities of an integrating nature. Carried out with the support of the Virtual Campus (the debates are via forums, the seminars are virtual). In addition, each group has asynchronous communication tools to prepare for group work (mainly forums), as well as synchronous communication tools (mainly virtual meeting tools)	25 h
AF8: Tutorials, academic monitoring and evaluation, through the Virtual Campus. Some assessment tests that require it (e.g. exams) may be taken in person.	25 h
TOTAL	**150 h**

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based modality:

Assessment system	Min%	Max. %
Knowledge tests and exams	30%	50%
Reports and Essays	15%	30%
Alternative assessment techniques.	15%	30%
Field Experiences (Discussion Forum)	0%	10%
Competencies	15%	15%

Distance learning modality:

Assessment system	Min%	Max. %
Knowledge tests and exams	60%	60%
Reports and Essays	10%	20%
Alternative assessment techniques.	10%	20%
Conferences (discussion forum)	0%	5%
Competences	10%	20%

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the subject in the first exam period, you must obtain a grade greater than or equal to 5.0 out of 10.0 in the final grade (weighted average) of the course.

In any case, it will be necessary for you to obtain a grade greater than or equal to 5.0 in the final exam of the course, so that it can average with the rest of the activities.
When the minimum required to carry out the weighted average of the assessable activities is not met (the minimum is not reached in any of the previous points), the final grade will be:

- the weighted average if its value is less than or equal to 4
- 4 if the weighted average value is greater than 4

The grade in the call will be considered as **NP** (Not Presented) when the student has not submitted any of the assessable activities that are part of the weighted average.

7.2. Second exam call

To pass the subject in the second exam period, you must obtain a grade greater than or equal to 5.0 out of 10.0 in the final grade (weighted average) of the course.

In any case, it will be necessary for you to obtain a grade greater than or equal to 5.0 in the final exam of the course, so that it can average with the rest of the activities.
When the minimum required to carry out the weighted average of the assessable activities is not met (the minimum is not reached in any of the previous points), the final grade will be:

- the weighted average if its value is less than or equal to 4
- 4 if the weighted average value is greater than 4

The grade in the call will be considered as **NP** (Not Presented) when the student has not submitted any of the assessable activities that are part of the weighted average.

8. SCHEDULE

This section indicates the schedule with delivery dates of assessable activities of the subject:

Assessable activities	Date
Activity 1: *Carrying out different work, problems and application exercises , reports of laboratory practices, reports of visits, conferences and workshops carried out and collaborative work*	Week 2-15
Activity 2: *Active participation (questions and problems proposed and discussed in the classroom or in the subject forum)*	Week 1-16
Activity 3: *Intermediate Written Tests*	Week 4/5; 10/11
Activity 4*: Final project of the subject*	Week 14-16
Activity 5*: Final exam of the subject*	Week 15-16

This schedule may be modified for logistical reasons of the activities. Any modification will be notified to the student in a timely manner.

9. BIBLIOGRAPHY

The recommended bibliography is indicated below:

- Txelo Ruiz Vazquez, "Basic Analysis of Electrical and Electronic Circuits". Pearson Education (2004)
- David Báez-López and Félix E. Guerrero-Castro, "Circuit Analysis with Multisim", in "Synthesis Lectures on Digital Circuits and Systems", Morgan & Claypool (2011), Vol. 6, No. 3, Pages 1-19, available at

  https://www.morganclaypool.com/doi/pdfplus/10.2200/S00386ED1V01Y201109DCS035
- Robert L. Boylestad, Louis Nashelsky. "Electronics, Theory of Circuits and Electronic Devices". Pearson Education (2009)
- Course notes available on the virtual campus.

It is also recommended to download the National Instrument MULTISIM as a circuit analysis tool.

10. DIVERSITY CARE UNIT

From the Educational Guidance and Diversity Unit (ODI) we offer support to our students throughout their university life to help them achieve their academic achievements. Other pillars of our action are the inclusion of students with specific educational support needs, universal accessibility on the different campuses of the university and equal opportunities.
This Unit offers students:

1. Accompaniment and follow-up through the realization of personalized counseling and plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made, that is, at the level of methodology and evaluation, in those students with specific educational support needs, thus pursuing equality of opportunities for all students.
3. We offer students different extracurricular training resources to develop various skills that will enrich them in their personal and professional development.
4. Vocational guidance through the provision of tools and advice to students with vocational doubts or who believe that they have made a mistake in the choice of degree.

Students who need educational support can write to us at:
orientacioneducativa@universidadeuropea.es

11. SATISFACTION SURVEYS

Your opinion matters!

The European University encourages you to participate in satisfaction surveys to detect strengths and areas for improvement in the teaching staff, the degree and the teaching-learning process.

The surveys will be available in the survey space of your virtual campus or through your email.

Your assessment is necessary to improve the quality of the degree.

Thank you very much for your participation.