1. OVERVIEW

Subject area	Circuit Analysis
Degree	Bachelor's Degree in Computer Engineering
School/Faculty	School of Architecture, Engineering and Design
Year	Second
ECTS	6 ECTS
Type	Core
Language(s)	Spanish
Delivery mode	On campus / Online
Semester	Fourth
Year	2022-2023
Coordinating professor	María José Terrón López
Teacher	María José Terrón López

2. INTRODUCTION

This subject area belongs to the "Physics" subject, formed by the following core subject areas: CIRCUIT ANALYSIS 6 ECTS (2nd year)

In the "Circuit Analysis" subject area, the students will have their first look at electric circuits and electronics. The subject area's importance in the syllabus is to provide students with the theoretical concepts and laws that govern the theory of circuits and electronics.

This therefore lays the foundations for circuit analysis: voltage, current and power calculations and circuit analysis methods for both direct current (dc) and alternating current (ac).

In addition, students will acquire basic knowledge of electronics and electric devices. This will allow for the interpretation and understanding of analogue circuits and digital technologies necessary for other subject areas on digital electronics and the interconnection of integrated circuits and peripherals.

The aim is for students to be able to identify and learn the basic function of different electronic components and circuits. At the same time, students should also be able to simulate the behaviour of the different circuits studied using computer tools.

3. SKILLS AND LEARNING OUTCOMES

Basic skills (CB, by the acronym in Spanish):

- CB4 – Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

General skills (CG, by the Spanish acronym):

- CG08: Knowledge of the core topics and technologies, which enable the students to learn and develop new methods and technologies, as well as give them the versatility to adapt to new situations.

- CG10: Knowledge to carry out measurements, calculations, valuations, appraisals, expert's reports, studies, reports, task planning and other similar computer-related work.

Transversal skills (CT, by the acronym in Spanish):

- CT4. Ability to analyse and synthesise: be able to break down complex problems into manageable blocks; evaluate other options and perspectives to find the ideal solution.
- Synthesising to reduce the complexity and better understand the situation and/or solve problems.
- CT6: Oral or written communication: Ability to communicate and gather information, ideas, opinions and viewpoints to understand and be able to act, spoken through words or gestures or written through words and/or graphic elements.

Specific skills (CE, by the acronym in Spanish):

- CE2. Understanding and command of the basic concepts of fields, waves and electromagnetism, electrical circuit theory, electronic circuits, physical principle of semiconductors and logic families, electronic and photonic devices, and how they are used to solve engineering problems.

Learning outcomes (RA, by the acronym in Spanish):

- Understand the basic theoretical concepts of electronic circuits in CC and AC.
- Analyse circuits in CC and AC.
- Calculate transients.

Use the basic concepts of linear systems, functions and Laplace and Fourier transforms.

- Apply the acquired knowledge to solve circuit problems with resistors, capacitors, inductors and transformers and other electronic devices with initiative and decision-making.
- Use signal filtering.

The following table shows how the skills developed in the subject area match up with the intended learning outcomes:

Skills	Learning outcomes
CB4, CG8, CG10, CT4, CT6, CE2	Understand the basic theoretical concepts of electronic circuits in CC and AC.
CB4, CG8, CG10, CT4, CT6, CE2	Analyse circuits in CC and AC.
CB4, CG8, CG10, CT4, CT6, CE2	Calculate transients.
CB4, CG8, CG10, CT4, CT6, CE2	Use the basic concepts of linear systems, functions and Laplace and Fourier transforms.
CB4, CG8, CG10, CT4, CT6, CE2	Apply the acquired knowledge to solve circuit problems with resistors, capacitors, inductors and transformers and other electronic devices with initiative and decision-making.
C CB4, CG8, CG10, CT4, CT6, CE2	Use signal filtering.

7. ASSESSMENT

The content of the subject area is formed by four large sections:

- Analysis and theory of electric circuits.
- Materials technology. Introduction to semiconductors.
- Electronic and photonic devices Logic families
- Which will be looked at in greater depth in the following learning units

(UA, as their acronym in Spanish):

UA 1: Basic concepts of electric circuits in dc.

UA 2: Basic concepts of electric circuits in ac.

UA 3: Semiconductors and Diodes.

UA 4: Operational Amplifiers.
UA 5: Bipolar and field-effect amplifiers.
UA 6: Introduction to digital electronics. Digital Logic Families.

5. TEACHING/LEARNING METHODS

The types of teaching/learning methods are as follows:

Survey on aims and interests.
- Lectures, subjects of study and seminars.
- Laboratory work.
- Group problem-solving
- Fieldwork, conferences, visits to companies and institutions.

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On campus:

Learning activity (AF, by the acronym in Spanish)	Number of hours
AF1: Lectures, reading on main topics and complementary materials, implementation of activities carried out independently and collectively	50 h
AF2: Integrative group work	25 h
AF3: Independent working	50 h
AF4: Tutorials, academic monitoring and assessment	25 h
TOTAL	**150 h**

Distance learning:

Learning activity (AF, by the acronym in Spanish)	Number of hours
AF3: Independent working	50 h
AF6: Independent reading on complementary topics and materials and implementation of activities carried out independently. Subsequently, asynchronous group discussion on the Campus Virtual forum, and online seminars with the synchronous e-learning tools on the Campus Virtual.	50 h
AF7: Integrative group work, consisting of participation in debates and seminars, and group implementation of integrative activities. Carried out with the support of Campus Virtual (the debates are held via forums; the seminars are online). In addition, each group will have asynchronous communication tools to prepare the group work (mainly forums), as well as synchronous communication tools (mainly virtual meeting tools).	25 h
AF8: Tutorials, academic monitoring and assessment through the Campus Virtual. Some assessment tests (e.g. exams) will be carried out on-campus when necessary.	25 h

TOTAL	150 h

7. ASSESSMENT

The assessment systems, plus their weighting in the final grade for the subject area, are as follows:
On campus:

ASSESSMENT SYSTEMS	Min%	Max. %
Knowledge tests, exams and test	30%	50%
Reports and papers	15%	30%
Alternative assessment methods	15%	30%
Field experience (discussion forum)	0%	10%
Skills	15%	15%

Distance learning:

ASSESSMENT SYSTEMS	Min%	Max. %
Knowledge tests, exams and test	60%	60%
Reports and papers	10%	20%
Alternative assessment methods	10%	20%
Conferences (discussion forums)	0%	5%
Skills	10%	20%

On the Campus Virtual, when you open the subject area, you will find all the details of your assessable tasks and the deadlines and assessment procedures for each task.

7.1. Ordinary exam period

To pass the subject area in the ordinary exam period, you will need a final grade of at least 5.0 out of 10.0 (weighted average) for the subject area.

In any case, you will need a grade of at least 5.0 in the final test of the subject area for it to be included in the weighting with the other activities.

When the required minimum grades to carry out the weighted average of the assessable activities are not achieved (the minimum is not reached in any of the above points), the final grade will be:
- *The weighted average if its value is 4 or lower.*
- *4 if the weighted average is higher than 4.*

*The grade in the exam period will appear as **NP** (No grade reported), when students do not submit any of the assessable tasks that make up the weighted average.*

7.2. Extraordinary exam period (resits)

To pass the subject area in the extraordinary exam period, you will need a final grade of at least 5.0 out of 10.0 (weighted average) for the subject area.
In any case, you will need a grade of at least 5.0 in the final test of the subject area for it to be included in the weighting with the other activities.

When the required minimum grades to carry out the weighted average of the assessable activities are not achieved (the minimum is not reached in any of the above points), the final grade will be:

- *the weighted average if its value is 4 or lower.*
- *4 if the weighted average is higher than 4.*

*The grade in the exam period will appear as **NP** (No grade reported), when students do not submit any of the assessable tasks that make up the weighted average.*

8. TIMELINE

The timeline with submission dates for the assessable tasks in this subject area will be indicated in this section:

Assessable tasks	Date
Activity 1: *Implementation of different work, problems and application exercises, laboratory work reports, reports of visits, conferences and workshops, and collaborative work.*	Weeks 2–15
Activity 2: *Active participation (questions and problems proposed and discussed in the classroom or on the subject area's forum).*	Weeks 1–16
Activity 3: *Midterm written test*	Weeks 4/ 5, 10/ 11
Activity 4*: Final project of the subject area*	Weeks 14–16
Activity 5*: Final exam of the subject area*	Weeks 15–16

The timeline may be subject to change for logistical reasons related to the activities. Students will be informed of any changes in due time and course.

9. BIBLIOGRAPHY

The recommended bibliography is indicated below:

- Txelo Ruiz Vazquez, "Análisis básico de circuitos eléctricos y electrónicos". Pearson Educación (2004)
- David Báez-López and Félix E. Guerrero-Castro, "Circuit Analysis with Multisim", en "Synthesis Lectures on Digital Circuits and Systems", Morgan & Claypool (2011), Vol. 6, No. 3 , Pages 1-19 , disponible en https://www.morganclaypool.com/doi/pdfplus/10.2200/S00386ED1V01Y201109DCS035
- Robert L. Boylestad, Louis Nashelsky. "Electrónica, teoría de circuitos y dispositivos electrónicos". Pearson Educación (2009)
- Subject area notes are available on the Campus Virtual.
- In addition, you are recommended to download NI Multisim as a circuit analysis tool.

10. DIVERSITY AWARENESS UNIT

Students with special educational needs:

To ensure equal opportunities, curricular adaptations or adjustments for students with special educational needs will be outlined by the Diversity Awareness Unit (UAD, Spanish acronym).

As an essential requirement, students with special educational needs must obtain a report about the curricular adaptations/adjustments from the Diversity Awareness Unit by contacting unidad.diversidad@universidadeuropea.es at the beginning of each semester.

11. STUDENT SATISFACTION SURVEYS

Your opinion matters!

Universidad Europea encourages you to complete our satisfaction surveys to identify strengths and areas for improvement for staff, degrees and the learning process.

These surveys will be available in the survey area of your campus virtual or by email.

Your opinion is essential to improve the quality of the degree.

Many thanks for taking part.