

## 30302 - Circuits and systems

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 30302 - Circuits and systems

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 330 - Complementos de formación Máster/Doctorado  
581 - Bachelor's Degree in Telecommunications Technology and Services Engineering

**ECTS:** 6.0

**Year:** 581 - Bachelor's Degree in Telecommunications Technology and Services Engineering: 1

330 - Complementos de formación Máster/Doctorado: XX

**Semester:** Second semester

**Subject type:** 581 - Basic Education

330 - ENG/Complementos de Formación

**Module:**

### 1. General information

The general objective of this subject is to provide students with basic knowledge about circuits and systems, as well as to introduce them to common terminology and to enable the student to analyze simple linear systems and in particular electrical circuits.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>) and certain specific targets, so that the acquisition of the learning the learning results of the subject will contribute to some extent to the achievement of Goals 7.3 and 8.4, related to Goals 7 and 8.

### 2. Learning results

- To understand and correctly use the proper magnitudes, basic laws and fundamental theorems of electrical circuits.
- To be able to analyze first order circuits in the time domain.
- To know the fundamental properties and to know how to apply the Laplace transform to circuit analysis.
- To understand the elementary concepts of signals and linear systems and their relation to circuit theory.
- To know how to use the concepts of phasor, impedance and admittance in the analysis of sinusoidal steady state circuits.
- Be able to analyze circuits by using a circuit simulation program.

### 3. Syllabus

#### First Thematic Block

UNIT 1. Basic concepts of circuits and systems.

UNIT 2. Interconnection laws and fundamental circuit theorems.

UNIT 3. Systematic circuit analysis.

#### Second Thematic Block

UNIT 4. Time response of linear circuits.

- Basic signal waves.
- Differential equations approach. Transitory and permanent regime.
- Sinusoidal steady-state response. Phasor concept.

UNIT 5. The transformed circuit. Network function.

- Impedance and admittance concepts.
- Network function: Poles and zeros of the circuit. Relationship with natural and forced response.
- Complex Power. Maximum power transfer.

### 4. Academic activities

- **Participative lectures:** 38 hours

The contents of the subject will be presented with a practical orientation.

- **Problem solving and case studies:** 10 hours

In this type of session, the approach and resolution of a set of standard problems is addressed, encouraging a critical spirit.

- **Laboratory practices:** 12 hours

Practical assemblies will be carried out in the laboratory with the appropriate instruments.

- **Teaching assignments:** 14 hours

Including the preparation of laboratory practice reports

- **Study and personal work:** 70 hours
- **Assessment tests.** 6 hours

## 5. Assessment system

The subject will be assessed by the continuous assessment system by means of the following activities:

- **Final written test (70% of the grade, minimum 4 out of 10).** This test comprises the thematic blocks I and II of the subject. The first thematic block accounts for 30% of the grade for this test. The second thematic block is the remaining 40%. The minimum grade required in each thematic block of the written test is 3.
- **Laboratory practicals (30% of the grade, minimum 5 out of 10).** Compulsory attendance to the practical sessions of laboratory (according to the exception stamp). Therefore, it is mandatory to complete and pass the laboratory practices in order to pass the subject. The following aspects will be evaluated:
  - Previous preparation of the practice.
  - Handling of instruments and solutions provided.
  - Deepening in practice.
  - Report made at the end of each practice.
  - Student autonomy and participation.

If the student has not passed any of these activities during the semester, they will have the opportunity to pass the subject by means of a global test in the two official exams. In the event that the student had failed the laboratory practices, the global test of the 2nd call will include a practical exam in the laboratory.