

## 30311 - Analog Electronics

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 30311 - Analog Electronics

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

**Degree:** 438 - Bachelor's Degree in Telecommunications Technology and Services Engineering  
581 - Bachelor's Degree in Telecommunications Technology and Services Engineering

**ECTS:** 6.0

**Year:** 2

**Semester:** Second semester

**Subject type:** Compulsory

**Module:**

### 1. General information

The objective of this subject is to provide the knowledge, methodologies and basic tools necessary for the analysis and design of electronic circuits oriented to analog signal processing (characteristics and basic stages of operational amplifiers) and power processing (power stages and configurations).

It is advisable, if not essential, to have taken the subjects Circuits and Systems (Year 1, semester 2) and Fundamentals of Electronics (year 2, semester 1).

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 agenda of United Nations (<https://www.un.org/sustainabledevelopment/es/>) so that the acquisition of the learning results of the subject will contribute to the achievement of targets 7.1 and 7.3 of Goal 7, targets 8.2 and 8.4 of Goal 8, targets 9.4 and 9.5 of Goal 9 and target 13.3 of Goal 13.

### 2. Learning results

- Have the ability to apply the knowledge acquired in Circuits and Systems Theory, Fundamentals of Electronics in the design of analog signal processing systems.
- Understand amplification, feedback theory and its application to analog electronic systems.
- To understand the operation and characteristics of the ideal operational amplifier (AOI).
- Be able to design circuits based on AOIs: basic functions, amplifiers, oscillators and active filters.
- Know how to use simulation tools to support analog design, search and interpret datasheets of the components and systems used.
- Master the basic laboratory measurement techniques for analog electronics.
- Know the basics of power processing in a communications system and be able to use different power sources.

### 3. Syllabus

Topic 0 - Introduction

Topic 1 - Amplifiers and feedback (concept, basic topologies, effects of feedback)

Topic 2 - Operational amplifiers (structure, characteristics and limitations; the ideal operational amplifier (A.O.I.) Topic 3 - Stages based on ideal operational amplifiers (calculation stages, filtering, instrumentation, conversion, comparison, generation and modulation of signals).

Topic 4 - Energy conversion (energy conversion; power electronic devices; power amplifiers; performance calculations; radio frequency applications)

### 4. Academic activities

Lectures: 29 hours.

Types of problems: 16 hours.

In parallel, and in synchronized sequence with the classroom teaching, six laboratory sessions of two and a half hours are foreseen in which different stages and basic blocks presented in the lectures will be implemented and characterized.

Laboratory practices: 15 hours.

- The operational amplifier (O.A.) without and with feedback
- Basic stages with A.O. and resistors
- Filtering and instrumentation stages with A.O.

- Signal generating stages with A.O.
- Oscillators - AM Transmitter
- AM receiver - Amplifier in complementary symmetry

## 5. Assessment system

### 1. Laboratory Practices (CL)

They will be graded by observation of the students' work in the laboratory (handling of laboratory instruments, assembly capacity, circuits start-up, circuit reasoning and simulator handling) and by evaluation of the previous preparatory work.

It will account for **25%** of the overall grade.

Minimum grade of **4 points out of 10**.

### 2. Review of questions and exercises (CT)

Composed of theoretical-practical questions and exercises.

It will account for **75%** of the overall grade.

Minimum grade of **4 points out of 10**.

### GLOBAL TEST (OFFICIAL CALLS)

#### First call

This subject has an exceptional seal of continuous assessment in its practical part (according to Art. 9.4 of the Evaluation Regulation). Therefore, the grade in this activity is transferred to the global test of the first call without the possibility of recovery.

Tests:

- Review of issues and exercises

#### Second call

Tests:

- Review of issues and exercises
- Laboratory examination: The exam will consist of the implementation and/or simulation of circuits similar to those developed during the term in the laboratory practice sessions.

Due to logistical needs, in order to attend the class, the student will have to make a previous request within the period that will be communicated in class.

**Once the minimum grades for each part have been passed**, the final grade for the subject will be: **0.25xCL + 0.75xCT** In case **the minimum grades are not exceeded**, the final grade will be: **minimum (CL, CT)**

The subject is passed with a total grade of 5 points out of 10.