

## 60032 - Communication physics

### Syllabus Information

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**Academic year:** 2023/24

**Subject:** 60032 - Communication physics

**Faculty / School:** 100 - Facultad de Ciencias

**Degree:** 538 - Master's in Physics and Physical Technologies  
589 - Master's in Physics and Physical Technologies

**ECTS:** 5.0

**Year:** 1

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

The purpose of this subject is to help the student to become familiar with theoretical concepts and experimental techniques used in the design and characterization of a communication system. Topics covered include electromagnetic radiation generation, propagation and detection, signal modulation and coding, properties of communication channels and the main transceiver architectures.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement:

- SDG 4 (Quality education)
- SDG 9 (Industry, Innovation and Infrastructure)
- SDG 11 (Sustainable Cities and Communities)

### 2. Learning results

- To determine the evolution of the characteristic parameters of an electromagnetic signal as a function of the propagation channel.
- To estimate the deformation of an electromagnetic signal in its propagation.
- To select the most suitable antenna type according to its transmitting and receiving properties.
- To distinguish the suitability of transceiver architectures according to the channel-signal context.
- To model a simplified high-speed serial communication system and extract the error rate from the signal-to-noise ratio.
- To calculate the fundamental parameters of an analogue receiver from the analysis and simulation of its structure.
- To interpret the specifications of a complete communication system.

### 3. Syllabus

The contents of the subject cover the following topics:

1. Introduction
2. Communications theory
3. Electromagnetic signal propagation: advanced treatment
4. Antennas
5. Main blocks in the transmitter of a communications system
6. Main blocks in the receiver of a communications system

### 4. Academic activities

The program offers the students help to achieve the expected results and comprises the following activities:

- Lectures, seminars on specific tools, presentation sessions and group problem-solving classes.

- Laboratory sessions.
- Personal work
- Study, presentation and discussion of selected topics in class.

## 5. Assessment system

The student must demonstrate achievement of the intended learning results through the following assessment activities:

- Resolution of exercises derived from the theoretical classes, their delivery on the set deadlines and possible presentation in class. Exercises not submitted on time will be graded with 0 points. This activity will be graded from 0 to 10 points and will represent 40% of the student's grade in the subject.
- Practical exercises, solving of the questionnaire corresponding to each practical session and its delivery on the corresponding deadlines. Questionnaires not submitted on time will be graded with 0 points. This activity will be graded from 0 to 10 points and will account for 40% of the student's grade in the course.
- Production of proposed thematic works and their possible presentation in class, on a pre-established date. The student will be able to choose among different thematic works, of bibliographic and/or theoretical-practical nature, proposed by the teachers. This activity will be graded from 0 to 10 points and will represent 20% of the student's grade in the course.

In order to pass, it is essential to obtain at least 4 points in each of the assessed activities.

Passing the subject by means of a single global test.

The student who has not passed the subject with the proposed activities or who wishes to obtain a higher grade is entitled to a global test, which will take place during the period set for the exams. This test will consist of a theoretical and practical exercise.