

## 30374 - Radiation and propagation

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 30374 - Radiation and propagation

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

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

**ECTS:** 6.0

**Year:** 3

**Semester:** First semester

**Subject type:** Compulsory

**Module:**

### 1. General information

Radiation and Propagation aims to introduce the student to the aspects related to the radio transmission associated with communications, localization and remote sensing systems. As a subject of common training, it contributes to the training in emitting and receiving devices, propagation and transmission related to electromagnetic and acoustic waves.

In order to follow this subject normally, it is recommended that the student has previously taken the basic subjects (especially Calculus, Algebra, Vector and Differential Calculus, Mathematics for TelecommunicationS, Fundamentals of Physics and Circuits and Systems) and the subject Electromagnetism and Waves.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development 2030 Agenda of

United Nations (<https://www.un.org/sustainabledevelopment/es/>) and the activities foreseen in this subject will contribute to some extent to the achievement of targets 7.3, 7b, 8.2, 9.1, 9.5 and 9c of the corresponding goals.

### 2. Learning results

RA1- Know the mechanisms of propagation and transmission of electromagnetic and acoustic waves.

RA2- Know how work and to use the corresponding transmitter and receiver devices.

RA3- Know how to use the concepts of wave propagation in different media and their fundamental parameters, as well as its propagation in free space.

RA4- Know the mechanism of radiation and the different basic parameters of antennas as well as the main families of antennas and their application.

RA5- Know how to identify the fundamental block diagrams and the characteristic parameters of transmitters and receivers in a radio communications system.

RA6- Correctly pose the problem from the proposed statement and identifies the options for its resolution . Apply the appropriate solving method and identify the correctness of the solution.

RA7- Know and use correctly the tools, instruments and software applications available in the laboratories correctly performs the analysis of the collected data.

### 3. Syllabus

#### Theory

Topic 1. Fundamentals of Transmission Lines.

Topic 2. Introduction to Radio Transmitters and Receivers.

Topic 3. Elementary modeling of antennas in radio communication.

Topic 4. Electromagnetic and acoustic analysis of radiating structures.

Topic 5. Wave propagation in radio environments.

#### Practices (As a guideline)

PR1 - Antenna characteristic parameters.

- PR2 - Propagation in indoor environments.
- PR3 - Basic radiant structures.
- PR4 - Clusters of Radiant Structures.
- PR5 - Radio links: effects of atmospheric refraction and obstacle diffraction.

## 4. Academic activities

### Face-to-face activities

Times and dates defined by EINA.

- Participative lectures: 40 hours, in classroom.
- Problem solving and case studies: 10 hours, in classroom.
- Laboratory practices: 10 hours in 5 two-hour sessions, in small groups, in the laboratory.
- Assessment tests: 3 hours, in classroom.

### Other activities:

- Tutored group work (information search, case resolution, report writing, meetings): 24 hours
- Personal work (study, problem solving and writing practice reports): 63 hours

## 5. Assessment system

The student will have a global test in each session. The grade will be calculated as follows:

Written exam (70%) with two parts, both with the same weight: a theoretical part in which the acquired knowledge is evaluated by means of a series of short questions and a practical part in which the ability to solve problems is evaluated.

1. Laboratory practicals (15%) The assessment will be carried out through the presentation of a written report in a specified format, with a deadline for each practice.

2. Tutored group work (15%): The assessment will be carried out by means of a written report with a deadline for the delivery which will include theoretical developments and the resolution of concrete problems.

3. In order to pass the subject it will be necessary to obtain a minimum of 4.5 out of 10 in each of the three parts that make up the assessment (exam, practicals and assignments).

Those students who have not been able to complete the practices and/or work during the term will have the possibility of passing them by means of an exam in the corresponding call