

26942 - Microwaves: Propagation and Aerials

Syllabus Information

Academic year: 2023/24

Subject: 26942 - Microwaves: Propagation and Aerials

Faculty / School: 100 - Facultad de Ciencias

Degree: 447 - Degree in Physics

ECTS: 5.0

Year:

Semester: First semester

Subject type: Optional

Module:

1. General information

The objective of this subject is to provide the student with a broad vision of the physical phenomena associated with the generation and propagation of electromagnetic waves, essentially in the microwave range, as well as their applications.

The subject consists of two parts:

- Transmission lines and waveguides.
- Radiation fields originated by antennas and their clusters, with an initiation to synthesis.

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/>), in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement:

- Goal 9: Industry, Innovation and Infrastructure.
- Goal 11: Sustainable Cities and Communities

2. Learning results

- Relate the geometrical parameters of a transmission line to its distributed parameters as a circuit and to the parameters describing propagation.
- Characterize the propagation of signals through transmission systems.
- Apply the necessary calculation methods to adapt different microwave devices with their transmission systems
- Know the characteristics and properties of the most common antennas.
- Analyse, calculate and measure radiation patterns of individual antennas and antenna clusters.
- Calibrate the electromagnetic compatibility conditions of simple systems.

3. Syllabus

1. Electromagnetic wave propagation: lossy media.
2. Transmission lines.
3. Waveguides.
4. Antennas and their characterization.
5. Antenna clusters.

4. Academic activities

- Sessions where the teacher will explain the subject's topics. 35 hours.
- Problem classes: Resolution of practical cases in the classroom. 5 hours.
- Laboratory sessions: 10 hours.
- Study of the material and preparation of reports of the laboratory sessions: 70 hours.
- Assessment 5 hours.

5. Assessment system

Midterm exams (10% of the grade)

Individual theoretical-practical written tests.

Laboratory practices (20% of the grade)

The following aspects will be assessed:

Previous preparation of the practice.

Fluency in taking measures and providing solutions to the problems encountered.

Report made at the end of each practice.

Autonomy and participation of each student.

If the student does not reach the passing grade, they will have to take the global test to pass the subject

Written exam (70% of the grade)

It will consist of two exercises, one of theory and the other of problems. The first will consist of reasoned answers to questions on concepts and phenomena, description of examples or small demonstrations. In the problem exam, the student will find practical cases of the type of those solved in class during the term. The grade of the exam will be the average of those obtained in these two exercises, being necessary to pass the subject that both are greater than or equal to 3, out of 10, and that the average is greater than or equal to 5.

In order to pass the subject, students will also have the option of taking a single global test that will consist of two parts the first one, an exam with the same structure described in the previous paragraph (80% of the grade); and the second one, a laboratory practical exercise (20% of the grade) In each of the two parts, a passing grade must be reached in order to pass the subject.