Universidad Zaragoza

Academic Year/course: 2023/24

60956 - Radar, radionavegation and satellite systems

Syllabus Information

Academic year: 2023/24
Subject: 60956 - Radar, radionavegation and satellite systems
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 623 - Master's Degree in Telecommunications Engineering
ECTS: 6.0
Year: 1
Semester: First semester
Subject type: Compulsory
Module:

1. General information

In the context of radar systems, the student is expected to understand the basic principles of continuous wave and pulsed wave radar systems, and the characteristics that current radar systems should have depending on the application. With regard to satellite communications systems and radio navigation systems, the student is expected to understand their topology based on the physical and mathematical principles necessary for the transmission of the transmission of information or for the determination of position, as the case may be, and to understand the limitations and difficulties of implementation with real devices.

These approaches and objectives are aligned with some of the Sustainable Development Goals, SDGs, of the 2030 Agenda(https://www.un.org/sustainabledevelopment/es/): Goal 8, Objective 8.2 and Goal 9, Objectives 9.5 and 9.c.

2. Learning results

- To understand and use the basic parameters that describe the characteristics of satellite communications systems and their subsystems.

- To know the basic concepts of satellite radio navigation systems and orbital mechanics, as well as terrestrial systems (based on radio beacons and hyperbolic systems).

- To understand the architecture of satellite navigation systems (GPS, augmentation systems and Galileo) in their three segments: space, control and user, the services offered, the structure of the signals used and the mathematical basis for calculating the user's position.

-To understand and use the basic parameters describing the characteristics of radar systems and the operation of pulsed and continuous wave radar techniques and their applications.

3. Syllabus

Block 0. Introduction.

* Presentation of the subject.

* Basic knowledge required

Block I. Radar Systems.

* Introduction to radar.

* Basic concepts and technologies of radar systems: pulsed and continuous wave

* Interference from the environment and its treatment

* Advanced radar techniques

Block II. Satellite Communications Systems.

* Fundamentals of Orbital Mechanics and Geodesy.

* Satellite subsystems and space environment.

* Channel and Link calculation.

* Communication Techniques in Satellite Communications Systems: physical layer and Multiple Access.

Block III. Radiolocation Systems.

* Coordinate and projection systems for radiolocation systems. Mathematical methods of position estimation.

* Directional and hyperbolic radio navigation systems: terrestrial systems.

* GNSS systems.

4. Academic activities

Theoretical classes: 3 hours of theoretical classes will be given weekly, according to the class schedule and structured in the topics related to the subject program (43 hours).

Problem classes: Dedicated to problem solving, consulting, critical sessions and joint expositions (9 hours).

Laboratory practices: 4 laboratory practices of two hours each will be developed (8 hours)

5. Assessment system

The subject will be evaluated as follows:

1.**Laboratory practices (25%, minimum of 5 out of 10)**: The laboratory practices to be carried out by each student will be evaluated through the reports submitted by the students and/or orally.

Students who have not obtained the minimum grade in the laboratory practices will have to take a test related to them in the global assessment test.

Final exam (75%, minimum of 4.5 out of 10): This is a written test that may include problem solving as well as theoretical and practical questions. This test evaluates all the learning results defined for the subject.

The student is entitled to a global test in each of the exams established throughout the academic year. Dates and times will be determined by the School.