Universidad Zaragoza

**Academic Year/course: 2023/24**

# 30318 - Digital Communications

## Syllabus Information

**Academic year:** 2023/24
**Subject:** 30318 - Digital Communications
**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:** 581 - Bachelor's Degree in Telecommunications Technology and Services Engineering: 3
438 - Bachelor's Degree in Telecommunications Technology and Services Engineering: 2

**Semester:** 438 - Second semester
581 - First semester
**Subject type:** Compulsory
**Module:**

## 1. General information

The Digital Communications subject aims at the knowledge and understanding of the different blocks that integrate a digital communications system, completing the concepts that have been acquired in the subject of Communication Theory. The main objectives of the course are to achieve the learning outcomes and the acquisition of competencies listed in this guide.

These approaches and objectives are aligned with the Sustainable Development Goals, SDGs, of the 2030 Agenda ( https://www.un.org/sustainabledevelopment/es/) and certain specific targets, such that the acquisition of the learning results of this subject will contribute to some extent to the achievement of target 8.2 of goal 8 and targets 9.1 and 9.5 of goal 9.

## 2. Learning results

- Understand the basics of information theory.
- Know the basic techniques for coding sources of both analog and discrete nature.
- Master the basics of channel coding. Know the techniques of block-type channel coding and of convolutional type. Understand the principles underlying the Viterbi algorithm.
- Understand the need for proper frequency, phase, symbol, and frame synchronization for proper operation of a digital communications system.
- Know the basic systems of frequency, phase, symbol and frame synchronization in digital communications systems.
- Understand the need for channel equalization and know the basic techniques.
- Understand the concepts underlying digital multicarrier modulations and spread spectrum communications.

## 3. Syllabus

- UNIT 1. SYNCHRONIZATION IN DIGITAL COMMUNICATIONS SYSTEMS
- UNIT 2. BASIC ASPECTS OF INFORMATION THEORY AND SOURCE CODING
- UNIT 3. CHANNEL CODING
- UNIT 4. CHANNEL EQUALIZATION
- UNIT 5. MULTIPULSE AND MULTICARRIER MODULATIONS

## 4. Academic activities

- **Participative lectures: 40 hours**

  Presentation by the teacher of the main contents of the subject.
- **Problem solving and case studies: 10 hours**

  Problem solving and case studies of the fundamentals presented in the lectures.
- **Laboratory practices: 10 hours**

  Carrying out a set of laboratory practices to consolidate the theoretical concepts developed in the lectures.
- **Practical teaching assignments: 20 hours**

  Practical work in teams supervised by the teacher.
- **Study and personal work. 64 hours**
- **Assessment tests. 6 hours**

## 5. Assessment system

The subject will be assessed in the global assessment modality by means of the following activities:

**E1: Laboratory practicals (20% of the grade, minimum grade 4 out of 10)**

The laboratory practices of the course represent 20% of the final grade. Its assessment will be based on the reports provided by the students and on the attitude and performance in the laboratory.

**E2: Practical teaching work (20% of the grade, minimum grade 4 out of 10)**

Teaching assignments represent 20% of the final grade. The assessment will assess the student's analytical and critical capacity , the originality of the solutions and, especially, the capacity to work in a team and the ability to transmit the relevant information orally and in writing.

**E3: Intermediate written test (30% of the grade, minimum grade of 4.5 out of 10)**

During the term there will be a written test that will be weighted 30% of the final grade. Obtaining a grade greater than or equal to 4.5 out of 10 in this test will exempt students from taking this part of the final exam (E4.1). In any case, they will be able to take this part to improve their grade.

**E4: Final exam (60% of the grade, minimum grade of 4.5)**

The final exam will consist of a written test divided into two parts (E4.1 and E4.2), both with the same weighting.

If the student has not passed any of these activities during the semester, they will have the opportunity to pass the subject by means of a global test in the two official exams.