Universidad Zaragoza

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

# 29834 - Digital Signal Processing

## Syllabus Information

**Academic year:** 2023/24
**Subject:** 29834 - Digital Signal Processing
**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura
326 - Escuela Universitaria Politécnica de Teruel
**Degree:** 440 - Bachelor's Degree in Electronic and Automatic Engineering
444 - Bachelor's Degree in Electronic and Automatic Engineering
**ECTS:** 6.0
**Year:** 4
**Semester:** First semester
**Subject type:** Optional
**Module:**

## 1. General information

The purpose ofthis subject is that the student acquires the necessary knowledge to understand the fundamentals and applications of discrete-time signal processing. Analysis, design and simulation tools will be used for the student to develop signal processing skills for application in solvingengineering problems.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (https://www.un.org/sustainabledevelopment/es/). The acquisition of the learning results of subject will contribute, to some extent, to the achievement of target 8.2 of Objective 8 and target 9.5 of Objective 9.

## 2. Learning results

- Classify signals and systems in discrete time according to different criteria.
- To know the theoretical principles of signal sampling and reconstruction techniques.
- Assess the advantages and disadvantages of different digital signal filtering strategies.
- Know the concepts of optimal filtering and adaptive filtering and be able to apply them as a problem-solving strategy.
- Use specific digital signal processing software.
- Use bibliography, by any of the means currently available, and use clear and precise language in your explanations of digital signal processing issues.

## 3. Syllabus

- Block 1: Signal analysis in the time and frequency domain. Signal sampling and reconstruction. Block 2. Digital signal filtering. FIR and IIR filters. Filter design.
- Block 3: Introduction to optimal filtering and adaptive filtering. The adapted filter. Wiener filtering. Algorithms of gradient descent.
- Block 4: Signal processing applications.

## 4. Academic activities

**Río Ebro Campus (Zaragoza).**

- Lectures (15 hours).
- Problem solving and case studies (15 hours).
- Computerized practices: (30 hours).
- Study (84 hours).
- Assessment tests (6 hours)

**Teruel Campus.**

- Lectures (15 hours).
- Problem solving and case studies (15 hours).
- Computerized practices: (30 hours).
- Teaching assignments and other activities (20 hours).
- Study (64 hours)
- Assessment tests (6 hours)

At EUPT, the course is taught in two different modalities: classroom and blended learning. For the presential modality all of the above applies. In the blended mode of the EUPT, the student will be provided with the materials necessary for the realization of the practices and works. These materials will be available on the web page of the subject ( http://moodle.unizar.es/). The student who needs it will be guided by the teacher with the help of online tutorials.

## 5. Assessment system

Continuous assessment Summative assessment with the following contributions:

- The first contribution comes from the continuous assessment of the laboratory activity: "laboratory notebook", which represents 40% of the final grade.
- Three tests will be conducted throughout the semester. Each of the tests will have a weight of 20% in the final assessment.

Evaluation by means of a single global test.

- This test will take place on the date scheduled for the official call and will consist of a global test with a weight of 100% in the final grade.

The assessment in the second call will be carried out by means of a single global test carried out in the period established for that purpose in the academic calendar.