

Academic Year/course: 2021/22

29834 - Digital Signal Processing

Syllabus Information

Academic Year: 2021/22

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

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process is mainly developed through working sessions, lectures and problem-solving sessions. In the lectures, the theoretical principles of discrete-time signal processing will be briefly and accurately presented. Problem-solving sessions, several problems will be solved with participation. The work will be done in small groups, where the student will have adequate tools and software to study the subject with a practical approach.

In short, the learning activities are:

- 1. Lectures (1 hour per week), in which the lecturer will explain and summarize the relevant basic principles and solve any questions that may arise in the laboratory. The participation of students in this activity is sought. In parallel, the student must do personal work in order to take a better profit from the lectures.
- 2. Problem-solving (1 hour per week), where the teacher will solve some problems selected application, subject to the qualification, seeking to complement the lectures with selected exercises.
- 3. Computer lab sessions (2 hours per week) which are distributed throughout the semester and constitute the main part of the course. Can be carried out through a remote access to lab equipment.
- 4. Individual work, in order to understand the theory, apply it to solving exercises and prepare the written reports. Especially relevant are the previous and posterior tasks before and after laboratory sessions. This activity is essential in the learning process of students and as a part of the course evaluation.
- 5. At Teruel campus, one hour per week is devoted to supervise individual assignments.

4.2. Learning tasks

The course includes the following learning tasks:

Campus Rio Ebro

1 Lectures T1 (15 hours). In this activity, fundamental contents of the subject are presented to the students in participative

lectures.

2 Problem-solving lectures T2 (15 hours). In these work sessions, problems are presented and solved with the participation of students. Students are encouraged to solve the problems on their own prior to the class where the professor solves them.

3 Computer Lab sessions T3 (30 hours). To carry out laboratory practices students have practice scripts, containing a theoretical introduction and guidelines for the development of the activity. It is necessary that the student goes to class laboratory practice script that will perform previously understood.

4 Self-study and individual work T7 (85 hours). It is very important that the workload is well distributed throughout the semester. It involves the personal study work, problem resolution and processing of laboratory results.

5 Evaluation T8 (5 hours). In addition to the qualifying function, evaluation is also a learning tool with which the students can test the degree of understanding that he/she has reached in the topics of the course.

Campus Teruel

1 Lectures T1 (15 hours). In this activity, fundamental contents of the subject are presented to the students in participative lectures.

2 Problem-solving lectures T2 (15 hours). In these work sessions, problems are presented and solved with the participation of students. Students are encouraged to solve the problems on their own prior to the class where the professor solves them.

3 Computer Lab sessions T3 (30 hours). To carry out laboratory practices students have practice scripts, containing a theoretical introduction and guidelines for the development of the activity.

4 Self-study and individual work T7 (25 hours). It is very important that the workload is well distributed throughout the semester. It involves the personal study work, problem resolution and processing of laboratory results.

5 Supervised assignments (60 hours, 45 off-site + 15 on-site). Individual tasks aimed at making uniform the work rate of the students and completing the learning process in specific topics.

6 Evaluation T8 (5 hours). In addition to the qualifying function, evaluation is also a learning tool with which the students can test the degree of understanding that he/she has reached in the topics of the course.

4.3. Syllabus

The course will address the following topic:

- Analysis of signals in the time and frequency domain. Sampling and reconstruction of signals.
- Digital filtering of signals. FIR and IIR filters. Filter design.
- Introduction to optimal filtering and adaptive filtering. The matched filter. Wiener filtering. Gradient descent algorithms.
- Signal processing applications.

4.4. Course planning and calendar

Lectures and problem solving classes, as well as practical sessions will be held according to schedule set by the center and published prior to the start date of the course. Each lecturer will inform about his/her own tutorship hours.