29834 - Digital Signal Processing

Información del Plan Docente

Academic Year	2016/17
Academic center	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
Course	4
Period	Half-yearly
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process is mainly developed through working sessions in the computier lab, 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 in the computer laboratory will be done in small groups, where the student will have adequate tools and software to study the subject with a practical approach.

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In short, the learning activities are:

1. Lectures (1 hour per week), given to the whole group, 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 outsed the classroom in order to take better profit of 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.

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.

5.2.Learning activities

The learning process in this course is based on the following activities:

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 go 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 through the semester. It involves the persona 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. It is necessary that the student go to class laboratory practice script that will perform previously understood.

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

5 Supervised assignments (60 hours, 45 non-presential + 15 presential). 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.

5.3.Program

The program offered to achieve the expected results, includes the following main topics:

- Analysis of signals in the time and frequency domain. Sampling and reconstruction of signals.

- Digital filtering of signals. FIR and IIR filters filters. Filter design.

- Introduction to optimal filtering and adaptive filtering. The matched filter. Wiener filtering. Gradient descent algorithms.

- Signal processing applications.

5.4.Planning and scheduling

Lectures and problem solving classes, as well as practical sessions will be held in the laboratory 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.

5.5.Bibliography and recomended resources

- Oppenheim, Alan Victor. Tratamiento de señales en tiempo discreto / Alan V. Oppenheim, Ronald W. Schafer ; traducción Javier Portillo ; revisión técnica Emilio Soria Olivas, Luis Vergara Domínguez, Antonio Albiol Colomer ; revisión técnica para Latinoamérica Alejandro Furfaro ... et al.] . - 3ª ed. Madrid : Pearson Educación, D.L. 2011
- Abreu Sernández, Victoria. Señales y Sistemas Discretos: Manual de Prácticas / Carlos Mosquera Nartallo, Francisco J. González Serrano. - 1ª Santiago de Compostela: Andavira editora
- Tratamiento digital de señales : problemas y ejercicios resueltos / Emilio Soria Olivas ... [et al.] Madrid [etc.] : Prentice Hall, D.L. 2003
- Widrow, Bernard. Adaptive signal processing / Bernard Widrow, Samuel D. Stearns Englewood Cliffs : Prentice-Hall, cop. 1985
- Haykin, Simon Saher. Adaptive filter theory / Simon Haykin . - 4th ed. Upper Saddle River, New Jesey : Prentice Hall, cop. 200