

29814 - Signals and systems

Syllabus Information

Academic year: 2024/25

Subject: 29814 - Signals and systems

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: 2

Semester: First semester

Subject type: Compulsory

Module:

1. General information

This subject is the first one in the basic control block, together with "Automatic control systems", "Control engineering" and "Industrial automation". The purpose of the subject is to train the student in the fundamentals of signal and system theory. In the field of signals, the focus will be on their frequency analysis, sampling and reconstruction. In the field of systems, the focus will be on the modeling of the dynamics of continuous/sampled and discrete systems, the analysis of their behavior and their simulation.

2. Learning results

At the end of the course, the student will be able to:

- Characterize signals and systems, both continuous and discrete, using the appropriate transformed domain, if necessary.
- Understand the processes of sampling and reconstruction of signals and their associated problems.
- Apply the techniques for the analysis of the behavior of systems, both continuous/sampled and discrete, knowing how to interpret the results.
- Know the basic fundamentals of system simulation.

3. Syllabus

- Continuous systems modelling.
 - Continuous signals and their representation.
 - Modelling tools.
 - Modelling of physical systems.
- Temporal analysis of continuous systems.
 - Time response of a LTI system.
 - Stability.
 - Transient analysis.
- Frequency analysis of signals and continuous LTI systems.
 - Frequency description of signals. Fourier transform.
 - Frequency transfer function.
 - Graphical representations: Bode and polar diagrams.
- Sampled signals and systems.
 - The computer as a system component. Sampling and reconstruction.
 - Algorithm modelling: difference equations.
 - Continuous systems discretization and simulation.
 - Transient response analysis.
- Modelling and simulation of discrete systems.
 - Discrete (event) systems. Finite-state machine.

Petri Nets.

Qualitative and quantitative properties. Study based on examples.

Simulation of discrete systems.

4. Academic activities

Río Ebro Campus (Zaragoza).

The distribution of activities to be carried out throughout the semester:

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

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- Lectures (30 hours).
- Problem solving and case studies (15 hours).
- Laboratory practices (15 hours).
- Study (87 hours).
- Assessment tests (3 hours)

At EUPT, the subject is taught in two different modalities: classroom and blended learning. For the presentational modality all of the above applies. In the blended mode of the EUPT (Teruel), the student will have the necessary materials for the realization of the practices and tutored work. These materials will be available at 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 the telematic tutorials.

5. Assessment system

Río Ebro Campus (Zaragoza).

In accordance with the regulations of the University of Zaragoza, the assessment of this subject is global. At each official call, the assessment will consist of two parts:

- Individual written test (80%). Graded between 0 and 10 points (CT).
- Laboratory practices (20%). Graded between 0 and 10 points (CP), they may be passed throughout the subject, based on previous study, development of the work, preparation of reports, resolution of questions, etc. However, for those students who have not passed this part during the term, or who wish to improve their grade, a specific individual test in the laboratory will follow the individual written test.

In order to pass the subject, it is essential to obtain a grade (both in TC and CP) higher or equal to 4 points (). Only in that case, the overall grade will be $(0.20 \cdot CP + 0.80 \cdot CT)$. Otherwise, the overall grade will be the minimum between 4 and the result of applying the above formula. The subject is passed with an overall grade of 5 points out of 10.

Additionally, throughout the month of November, there will be the possibility of releasing the part of the subject related to systems modeling, by means of an individual written test (28% of the total grade) specifically designed with for this purpose. Students who pass this partial exam will be exempted from answering the questions related to the modeling of the written test (52% of the final grade) to be taken in the official exams.

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At EUPT, the course is taught in two different modalities: classroom and blended learning:

A) Face-to-face mode. There will be two ways to pass.

1. Ordinary assessment. The student's summative assessment will have three contributions:

- 1.1. Test based on problems that will collect partial contents of the subject (in November, 25% in the final assessment).
- 1.2. Evaluation of the laboratory activity and in the work sessions: previous study and individual resolution of questions (15% of the final grade).
- 1.3. At the end of the term there will be a global test of the subject (60% of the final grade).

The grade for each of the tests described above must be at least 4/10 points in order to be averaged with the rest of the activities.

2. Evaluation by means of a single test. This test will take place at the end of the term and will consist of a global test of the subject (described in point 1.3 of the ordinary evaluation), but with a weight of 100% in the final grade.

B) Semi-attendance mode.

For those students who choose the blended option and cannot attend the practice sessions and tutored work, they may request not to include this contribution to average the grade. Thus, the weight in of the final grade of the partial control and the final test will be 30% and 70% respectively. Naturally, they will also have the option of evaluation by means of a single test.

6. Sustainable Development Goals

- 8 - Decent Work and Economic Growth
- 9 - Industry, Innovation and Infrastructure