Universidad Zaragoza

Academic Year/course: 2023/24

29624 - Control Engineering

Syllabus Information

Academic year: 2023/24
Subject: 29624 - Control Engineering
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 430 - Bachelor's Degree in Electrical Engineering
ECTS: 6.0
Year: 3
Semester: First semester
Subject type: Compulsory
Module:

1. General information

The objective of this subject is that the student acquires the necessary knowledge for the design of computer-based control systems, in particular discrete event systems and continuous systems discretized in time.

It is recommended to have taken the subject Automatic Systems, whose theoretical basis is used intensively in the subject.

These objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (https://www.un.org/sustainabledevelopment/es/) in such a way that the acquisition of the learning results of the subject will contribute to some extent to the achievement of targets 7.3 of Goal 7, and target 9.4 of Goal 9.

2. Learning results

In order to pass this subject, students shall demonstrate they have acquired the following results:

- Designs and implements the computer control of a system, selecting the most appropriate technique according to the control requirements and the context in which they arise.
- Applies system identification techniques in order to extract mathematical models suitable for use in control.
- Simulates the behavior of dynamic systems using appropriate computer tools.
- It designs a hierarchy of distributed control, solving both the communication needs between the different elements of the control, as well as the computerized supervision of the whole.

3. Syllabus

Unit 0: Introduction

Unit 1: Discrete (event) systems

1. Formalisms for representing SEDs and engineering interest
2. Deterministic Finite State Automata (DFA)
3. Mealy and Moore models. Transformations and minimization Limitations of DFAs
4. Petri Nets. Typical structures, modeling, analysis and properties

Unit 2: Computer control of continuous systems

1. Discrete-time signals
2. Z-transform: definition, properties, tables Description of sampled systems Discretization of continuous systems.
3. Analysis of sampled systems
4. Design of digital controllers
5. Practical aspects of scheduled implementation

Five practices related to the topics of the subject will be carried out.

4. Academic activities

Lectures (type T1): 30 hours

Lectures of theoretical and practical content.

Problem classes and case resolution (type T2) (15 hours of class).

Problems and case studies are developed.

Practical classes (type T3) :15 hours

The student carries out the simulation, implementation, and analysis of real automation and control systems.

Teaching assignments (type T6): 15 hours

Tutored work, the result of which is assessed as part of the evaluation of the practical work.

Personal study (type T7): 69 hours

Assessment tests (T8): 6 hours

5. Assessment system

In each call, the assessment will consist of two parts:

1. Individual written test (80%). Graded between 0 and 10 points (CT). It will be held during the exam period. In it, will evaluate the student on the set of learning outcomes from a theoretical and problem-solvingpoint of view.
2. Evaluation of practical work (20%). Graded between 0 and 10 points (CP), it may be passed throughout the term (class period). (Graded test). In any case, a specific individual test will be carried out during the overall test for those who are not able to pass it

students who have not passed it during the term. The student will be assessed on the set of learning results offrom the point of view of practical work.

In order to pass the course it is an essential condition to obtain two grades (CT and CP) higher or equal to 4.5 points out of 10. Only in this case, the overall grade for the subject will be (0.20*CP+ 0.80*CT). Otherwise, the overall grade will be the minimum between 4.5 and the result of applying the above formula. The subject is passed with an overall grade of 5 points out of 10..