Universidad Zaragoza

Academic Year/course: 2023/24

29936 - Automatic Control Systems

Syllabus Information

Academic year: 2023/24
Subject: 29936 - Automatic Control Systems
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 435 - Bachelor's Degree in Chemical Engineering
ECTS: 6.0
Year: 2
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

Automatic Systems presents the basic concepts of system control and its particularization to chemical systems.

The student learns to work with discrete event systems, to analyze the transient and permanent behavior of chemical systems and to be able to adapt it by means of appropriate control structures. At the end of the term the student will be able to understand the transcendence of system control and its importance in industrial processes.

These approaches and goals are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (https://www.un.org/sustainabledevelopment/es/), specifically, the learning activities planned in this subject will contribute to the achievement of objective 8.2 of Goal 8, and objective 9.1 and 9.4 of Goal 9.

2. Learning results

To pass this subject, students shall demonstrate they has acquired the following results:

- Identify the subsystems and their relevant interconnections to automate the overall system operation.
- Select the most appropriate modeling, analysis and design techniques according to the control requirements.
- Apply the techniques and methods for the design of the control system meeting the performance specifications

3. Syllabus

- Block 1. Modeling of continuous systems
  - Modeling of chemical systems using differential equations and Laplace transforms
  - Transfer function
  - Modeling using block diagrams
- Block 2. Analysis of continuous systems
  - Dynamic behavior of first and second order systems
  - Dynamic behavior of higher order systems
  - Analysis of feedback systems
- Block 3. Control of continuous systems
  - Behavior of feedback systems using root locus
  - PID controllers
  - Regulator design by root location
- Block 4. Control of discrete event systems
  - Definition of logical automatism
  - Automation control
  - SED modeling using Petri nets

4. Academic activities

1. **Master classes** by teachers. (30h)
2. **Resolution of problems** posed in class and practical work. (15h)
3. **Internships** tutored by teachers. In them they will apply, in a simulated or real environment, their theoretical knowledge, facing the limitations and constraints that are inherent to real systems. (15h)
4. **Personal study** by the students. It should be taken into account that the subject has a strong theoretical support and that the student must additionally understand and assimilate its importance in the world of industrial application. (84h)
5. **Assessment tests** (6h)

5. Assessment system

5. Assessment System

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

1. Individual written test (70%). Graded between 0 and 10 points (CT). It will be held during the test period.

The student will be assessed on the set of learning results from a theoretical and problem-solving point of view

2. Assessment of practical work (30%). Graded between 0 and 10 points (CP), it may be passed throughout the term (class period). . In any case, a specific individual test will be held during the exam period for students who have not passed it during the term, or who wish to improve their grade.

The student will be assessed on the set of learning results from the point of view of the practical work

In order to pass the subject it is an essential condition to obtain a grade higher or equal to 4 points in both TC and CP. Only in this case, the overall grade for the subject will be (0.30*CP+ 0.70*CT). Otherwise, the overall grade will be the minimum between 4 and the result of applying the formula above. The subject is passed with an overall grade of 5 out of 10