Universidad Zaragoza

Academic Year/course: 2023/24

30020 - Automatic Control Systems

Syllabus Information

Academic year: 2023/24
Subject: 30020 - Automatic Control Systems
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 436 - Bachelor's Degree in Industrial Engineering Technology
ECTS: 6.0
Year: 3
Semester: First semester
Subject type: Compulsory
Module:

1. General information

Approaches and objectives: to understand, model, analyze dynamic continuous systems, and design controllers. In addition, students will learn how to operate in a real control environment, identify its different elements, perform a system analysisand a computer-aided controller design, and experiment and fine-tune the designed controller on real systems.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (https://www.un.org/sustainabledevelopment/es/), in such a way that the acquisition of the learning outcomes of the subject provides training and competence to contribute to some extent to the achievement of the targets 3.6, 3.9, 7.3, 8.2, 9.4 of goals 3, 7, 8 and 9.

2. Learning results

- Identify the subsystems and their relevant interconnections to automate the overall operation of simple systems.
- Select continuous systems modeling techniques, their analysis, and the design of automatic controllers according to control requirements.
- Apply techniques and methods for the design of elementary control systems meeting the performance specifications.

3. Syllabus

1. Introduction to automatic control.

2. Modeling of continuous dynamic systems.

3. Analysis of the time response of continuous systems.

- Permanent regime. Transitional regime. Stability.
- Feedback.
- Place of the roots.

4. Frequency response analysis of continuous systems.

- Bode diagrams.
- Simplified Nyquist criterion.
- Relationship between time and frequency specifications.

5. Design of feedback control systems using frequency techniques.

6. PID control

- PID control variants.
- Other control schemes.

4. Academic activities

Lectures: 30 hours

Problem solving and case studies: 15 hours

Laboratory practices: 13 hours

Teaching assignments: 18 hours

Oriented to reinforce and also to assess (in part) the practical contents, especially those related to computer-aided analysis and computer-aided design).

Personal study work: 68 hours

Assessment tests. 6 hours

5. Assessment system

We consider very relevant the acquisition of practical skills, so their evaluation will be carried out throughout the four-month period on the basis of the work in each session, previous reports, resolution of questions, etc.

Thus, in each call, the assessment will include two parts:

1. Individual written test (CT) to evaluate theoretical knowledge and case resolution: 80% of the grade.

2. Assessment of practices (CP): 20%. It can be passed throughout the term, but a specific individual test will also be done during the assessment period for students who have not passed this part during the term.

In order to pass the subject it is mandatory to obtain a grade higher or equal to 4 in both parts, CT and CP. Only in that case the overall grade for the subject will be 0.8·CT+0.2·CP. 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 out of 10.