

30020 - Automatic Control Systems

Syllabus Information

Academic year: 2024/25

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

Objectives: for the student to know and manage the basic theoretical and practical content on automatic control of systems (understand the operation of continuous dynamic systems; apply modeling and analysis techniques, as well as design controllers according to specifications for the variables of the process to be controlled).

From a practical point of view, students will learn to operate in a real control environment, identify the different elements of a control system, perform computer-assisted system analysis and controller design, and experiment with and apply the designed controller on real systems.

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.
 - Steady-state. Transient response. Stability.
 - Feedback.
 - Root locus.
4. Analysis of the frequency response of continuous systems.
 - Bode plots.
 - Simplified Nyquist criterion.
 - Relationship between time-domain and frequency-domain specifications.
5. Design of feedback control systems using frequency-domain 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: 15 hours

Personal study work: 84 hours

Assessment tests: 6 hours

5. Assessment system

Global assessment

1. **Individual written test (CT), 75% of the grade.** Assessment of theoretical knowledge and case resolution.
2. **Practical credit evaluation (CP), 25% of the grade.** Assessment of practical knowledge acquired during laboratory

sessions. It consists of two parts:

- a. **Laboratory test (15%)**: to assess the assimilation of theoretical and practical concepts acquired in laboratory sessions and their corresponding previous reports.
- b. **Computer test (10%)**: to assess the handling of computer tools used during practical sessions.

Part 2.a. can be passed, as an alternative, throughout the course based on tests during laboratory sessions.

Overall grade of the subject

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 $0.75 \cdot CT + 0.25 \cdot CP$. 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.

6. Sustainable Development Goals

- 3 - Good Health & Well-Being
- 8 - Decent Work and Economic Growth
- 9 - Industry, Innovation and Infrastructure