

28823 - Regulation and Control of Automatic Systems

Syllabus Information

Academic year: 2023/24

Subject: 28823 - Regulation and Control of Automatic Systems

Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia

Degree: 424 - Bachelor's Degree in Mechatronic Engineering

ECTS: 6.0

Year: 3

Semester: First semester

Subject type: Compulsory

Module:

1. General information

Regulation and automatic control is the second subject of the curriculum in which the fundamentals of control techniques are addressed. Therefore, it allows to improve the scientific and technological foundations of automatic, modeling, simulation and control of systems.

This subject is part of the "Control" subject and requires other competences acquired in first and second year subjects, specifically it is based on the classical theory of automatic analog systems, fundamentals of complex variable, Laplace transform, Z-transform, systems of differential equations, algebra, matrices, physics and mechanics.

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 subject learning results provides training and competence to contribute to some extent to their achievement:

- Goal 7: Ensure access to affordable, secure, sustainable and modern energy.

2. Learning results

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

- Understand concepts related to industrial automation and control.
- Master modeling, analysis and design tools for control and automation systems.
- Acquire the fundamentals of industrial communications.

3. Syllabus

Proposed agenda

1. Introduction to digital control systems
2. Sequences
3. Z-transform
4. Signal sampling
5. Reconstruction
6. Sampled systems
7. Stability
8. Dynamic analysis of discrete systems
9. Feedback systems
10. Discretization of continuous controllers
11. Synthesis of discrete regulators

Practical contents

- Each block described in the previous section has practical exercises associated, by means of practical assumptions and/or physical or simulated assembly works, leading to obtaining the results and their analysis and interpretation.
- As the topics are developed, these practices will be proposed, preferably in class and also through the Moodle platform, will be carried out by students in practical sessions. Complementary practices that complete the theoretical training seen in the master class might come up.

4. Academic activities

The program offers the students help to achieve the expected results and comprises the following activities:

It involves the active participation of the students, so that in order to achieve the learning results, the following activities will be

carried out, without going beyond the above mentioned: **Generic face-to-face activities:**

- **Theoretical classes:** The theoretical concepts of the subject will be explained and illustrative practical examples will be developed to support the theory when necessary.
- **Practical classes:** Problems and case studies will be carried out as a complement to the theoretical concepts studied.
- **Laboratory practices:** Tutored by the teacher. The total group of theory classes may or may not be divided into smaller groups at, as appropriate.

Generic non face-to-face activities:

- Study and assimilation of the theory presented in the lectures.
- Understanding and assimilation of problems and case studies solved in practical classes.
- Preparation of seminars, resolution of proposed problems, etc.
- Preparation of group practices, preparation of the corresponding scripts and reports.
- Preparation of written tests for continuous assessment and final exams.

5. Assessment system

The student must demonstrate that they have achieved the expected learning results by means of the following assessment activities.

1. Practical work (30%). These assignments include laboratory practicals and problem solving. In some of the laboratory practices the students will be asked to carry out a previous study, which should be handed in before starting the laboratory tasks. The quality of the analysis that the students make of the results obtained in the laboratory, will be evaluated by means of a final report of each of the practices. In order to pass the subject, students must obtain a grade in each block of laboratory practices equal to or higher than 5.
2. Theoretical-practical written tests (70%) in which questions and/or problems from the field of engineering of similar complexity to that used during the course will be posed. The quality and clarity of the resolution strategy, the concepts used to solve the problems, the absence of errors in the development and solutions, and the correct use of terminology and notation will be evaluated. In each of the theoretical-practical written tests, students must obtain a grade equal to or higher than 5 to pass the subject.

The student will be able to choose between a continuous assessment, carried out in the form of two written tests and the delivery of the practice scripts throughout the term, or a global test at the end of the term and the delivery of the practice scripts. The student who has passed a part of the continuous assessment may sit for the global assessment exam only with the part of the continuous assessment not passed.