

28817 - Fundamentals of Automation

Syllabus Information

Academic year: 2023/24

Subject: 28817 - Fundamentals of Automation

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

Degree: 424 - Bachelor's Degree in Mechatronic Engineering

ECTS: 6.0

Year: 2

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

Fundamentals of automatics is the first subject of the curriculum in which the fundamentals of control techniques are addressed. Therefore, it allows to acquire, understand and apply the scientific and technological foundations of automatics, modeling, simulation and control of systems.

This subject is the first introduction in the field of regulation and control, the student will find other subjects on this topic that will expand the knowledge acquired, addressing topics such as discrete systems control, robotics and other advanced control techniques.

Alignment with the SDGs:

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

and, in particular, with the targets:

- 7.3: By 2030, double the global rate of energy efficiency improvement.

2. Learning results

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

- To understand the concepts related to industrial automation and control.
- Master modeling, analysis and design tools for control and automation systems.

3. Syllabus

Theoretical contents.

- Introduction to control systems
- Mathematical modeling of systems
- State variable models
- Characteristics of feedback control systems
- The behavior of feedback control systems
- The stability of linear feedback systems
- The root locus method
- Frequency response of control systems
- Stability in the frequency domain

Practical classes:

- Introduction to Octave/Matlab and mathematical models
- Open and closed loop systems
- Stability of feedback systems
- PID controllers and root method
- Introduction to Arduino programming

4. Academic activities

Face-to-face activities:

- Theoretical classes: The theoretical concepts of the subject are explained and illustrative practical examples are given to support the theory.
- Practical classes: Problems and case studies will be carried out as a complement to the theoretical concepts studied.

Non-face-to-face activities:

- Study and assimilation of the theory presented in the lectures.
- Understanding and assimilating problems and case studies solved in class.
- Resolution of proposed problems.
- Carrying out of group practices and preparation of reports.
- Preparation of written tests for continuous assessment and final exams.

The subject consists of 6 ECTS credits, which represents 150 hours of student work in the subject.

5. Assessment system

Students must demonstrate that they have achieved the intended learning results by means of the following assessment activities

- Practical work (30%). These assignments include 2 laboratory practicals and a complex design exercise. From each of the practices the student will be asked to submit a report that will serve as a basis for the assessment. To pass the subject, students must obtain a final grade of 5 or higher in the laboratory practicals.
- Theoretical-practical written tests (70%) in which questions and/or problems in the field of engineering of similar complexity to those used during the subject will be posed. The quality and clarity of the strategy of resolution, the concepts used to solve the problems, the absence of errors in the development and in the 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 in order to pass the subject.

The student will be able to choose between a split evaluation, carried out in the form of two written tests and the submission of the practice scripts throughout the term, or a global test at the end of the term (which will consist of one exam per term) and the delivery of the practice scripts.