29726 - Automatic Control Systems

Syllabus Information

Academic Year: 2021/22
Subject: 29726 - Automatic Control Systems
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 434 - Bachelor's Degree in Mechanical Engineering
ECTS: 6.0
Year: 3
Semester: Second semester
Subject Type: Compulsory
Module:

1. General information

1.1. Aims of the course

- Knowing the basics of automated systems: specifications on the dynamic behavior of the controlled system, and how to meet them by interconnecting systems (plant and controller) through sensors and actuators.
- Modeling, analyzing and experiencing the dynamic behavior of systems.
- Specifying and programming logic automation systems.
- Specifying and implementing PID control loops.

1.2. Context and importance of this course in the degree

Automatic systems is a common subject to the industrial branch of engineering degrees, according to the Order CIN/35/2009 (BOE February 20, 2009). In this context the basics of control systems and processes are presented. Students have completed basic courses in previous semesters, required to understand the mathematical models of systems. The student learns in the course to work with discrete event systems, to analyze the transient and permanent behavior of systems, and in enabled to adapt it, according to the desired requirements, through appropriate control structures. At the end of the course the student is able to understand the significance of control systems and their importance in industrial processes.

1.3. Recommendations to take this course

It is recommended that the student is familiar with the mathematical tools for modeling physical systems of various kinds, and with basic IT tools. This knowledge will be applied to conceive, analyze, simulate, and ultimately deploy control systems to achieve adequate automatic functioning.

2. Learning goals

2.1. Competences

Specific skills:

C23: Knowledge of the basics of automation and control methods.

Generic skills:

C4: Ability to solve problems and make decisions with initiative, creativity and critical thinking.

C6: Ability to use the techniques, skills and tools necessary for engineering practice thereof.

2.2. Learning goals

1. Identifies subsystems and relevant interconnections to automate the overall system.
2. Selects the most appropriate techniques for modeling, analysis and design based on control requirements.
3. Applies the techniques and methods for the design of the control system meeting the performance specifications

2.3. Importance of learning goals

Learning outcomes of this course give the student ability to design, manage and improve control systems, ubiquitous in any industry and in many products: today the automatic control is considered essential to reduce costs, both economic and environmental, and increasing final product quality.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

Students can obtain up to 2.5 points in "continuous assessment" (CA), based upon prior preparation and performance during laboratory sessions and demonstrated ability to understand the concepts and results in a practical assignment developed along the course, and presented near the end.

The final individual written test, or examen, is marked (Ex) up to 10 points. Students must demonstrate their knowledge and skills by answering theoretical and practical questions and solving problems similar to those of classes and practices.

Final mark is computed as max(Ex+CA,10) when Ex>=4, or Ex otherwise.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The process of teaching and learning will take place through lectures (presentation of content), solving-problem sessions (examples and practical cases with the active participation of students), laboratory practice (in small groups, with simulation tools or real systems) and conducting practical work and study supervised by teachers.

4.2. Learning tasks

The course includes the following learning tasks:

1) Theory (30 hours)

2) Problems and cases (15 hours)

3) Laboratory practices (15 hours)

4) Practical assignment (30 hours, including tutorials necessary to guide and advise the student).

5) Study and evaluation (60 hours, including tutorials)

In a flipped classroom style, students might be required to study some concepts behorehand, using recommended material, and later classroom sessions would be devoted to discussion, questions and answers, and resolution of exercises.

4.3. Syllabus

The course will address the following topics:

1. Automatic fundamentals.
2. Automation of discrete event systems. Programmable logic controllers (PLC's).
3. Dynamic behavior of continuous systems.
4. Feedback systems. Basic actions and control schemes. PID control.

4.4. Course planning and calendar

The schedule of the course for classroom and laboratory sessions is fixed by the Centre.

The academic calendar of activities will be available on the website of the center. The student must be aware of the dates detailed practical work and delivery of work which will be duly informed both in class and through the LMS.

4.5. Bibliography and recommended resources

La bibliografía actualizada se encuentra en la BR de la BUZ