Universidad Zaragoza

Academic Year/course: 2024/25

30044 - Flexible Automation and Robotics

Syllabus Information

Academic year: 2024/25
Subject: 30044 - Flexible Automation and Robotics
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 436 - Bachelor's Degree in Industrial Engineering Technology
ECTS: 6.0
Year: 4
Semester: First semester
Subject type: Optional
Module:

1. General information

The objective of the subject is to train the student in the key aspects related to handling robotics and flexible automation of production processes:

- As a paradigmatic machine of automation, the industrial robot stands out: On the one hand, those aspects related to the user's point of view of a robot are considered , such as its programming, as wellas the selection of the most suitable robot and its integration in an automated environment.
- On the other hand, the aspects of an industrial robot related to its internal operation and its design are considered design, which requires addressing the modeling of manipulators and the fundamentals of its control system and programming.
- In addition, different aspects of advanced programming of programmable controllers, industrial communications, supervisory systems.

The aim is to achieve that after passing the course the student has sufficient competence for the analysis, design and maintenance of automation systems and industrial robots. It is also intended that during the practical sessions has had a contact with real devices in all the aspects mentioned above.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (https://www.un.org/sustainabledevelopment/es/), specifically, the learning activities planned in this subject will contribute to the achievement of target 9.4 of Goal 9, and target 8.2 of Goal 8.

2. Learning results

The student, in order to pass this subject, must demonstrate the following results:

Know the architecture and programming languages of the devices used in the control of production plants, in particular robots and programmable logic controllers

Know the industrial communications and field buses, having sufficient criteria for their selection and subsequent implementation and operation.

Analyze the dynamics of polyarticulated mechanical systems and designs their control.

Know and apply automation and robotics models and tools in a productive environment.

Know how to design a flexible automation cell, selecting, integrating and programming the necessary elements.

3. Syllabus

1. -Robot control and programming

Industrial robot morphology, technologies involved.

Manipulator kinematics

Robot programming.

Robot control system: trajectory generation and dynamic control.

2. Flexible automation

Control hierarchy

Advanced PLC programming

Industrial communications

3. Selection and implementation of industrial robots

4. Industrial robotics research

4. Academic activities

The program offered to the student to help them achieve the expected results comprises the following activities:

Lectures of theoretical and practical content.

Problem and case solving classes

Problems and cases will be developed with the participation of the students, coordinated at all times with the theoretical contents. Part of this activity will be dedicated to the presentation of the cases to be dealt with in the subject work.

Laboratory practices

The student will carry out in the automation and robotics laboratory (Laboratory L0.06 of the Ada Byron building) a set of in which they will work with automatons and robots.

The practices to be carried out will address the following aspects:

- Spatial and kinematic localization with Matlab Robotic Toolbox
- Graphical simulation of industrial robots.
- Programming of ABB Irb120 industrial robots.
- Dynamic modeling and servo control
- Advanced programming of automatons, and integration of the robot in an automated cell.

Subject work

Personal study.

5. Assessment system

The student must demonstrate that they have achieved the intended learning results through the following assessment activities:

Evaluation of laboratory practices: carried out throughout the term (in each practical session), based on prior study, work development, preparation of reports or issue solving (30% of the final grade).

Subject work assessment: The assessment of the subject work will be based on the report submitted and the oral presentation made according to the schedule of presentations to be established (10-60%).

-Individual written test: consisting of theoretical and practical questions and problems. If the number of enrolled students allowsit , the theoretical/practical written test will be substituted by course work (10-60%).

-Global test: In the event that a student has not completed any of the previously mentioned evaluable activities throughout the term, each official call will include the global individual tests to be carried out in order to assess these activities.

6. Sustainable Development Goals

8 - Decent Work and Economic Growth
9 - Industry, Innovation and Infrastructure