Universidad Zaragoza

Academic Year/course: 2021/22

28831 - Automation Technology and Industrial Computing

Syllabus Information

Academic Year: 2021/22
Subject: 28831 - Automation Technology and Industrial Computing
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 424 - Bachelor's Degree in Mechatronic Engineering
ECTS: 6.0
Year: 4
Semester: First semester
Subject Type: Compulsory
Module:

1. General information

1.1. Aims of the course

Objectives of the subject.

The main objectives of the subjects can be divided into theoretical and practical (types).

The theoretical contents pursue that the student knows and manages fluently the concepts necessary for the analysis and development of controls in different industrial processes.

- Define the concept of the control system and identify and distinguish the variables activity and the process

the practical contents, basically, seen that the student knows how to manage the industrial components in the markets as well as the programming and configuration necessary to implement the different controls in real processes.

- Understand the system used for discrete control managing the different products we can find in the market.
- Program industrial PLC`s for the control of processes, as well as the management of sensors and industrial actuators.

1.2. Context and importance of this course in the degree

The subject "Automatizacion e Informática Industrial" is part of the degree of Mechatronics Engineering that EUPLA teaches with the group of subjects that make up the control module. This is a fourth course compulsory subject in the first semester with an academic load of 6 credits. These subjects give a thorough vision of the control system and industrial communication, as well as important practical training with different industrial.

controllers at the level of configuration and programming, enabling the student to analyze, develop and startup different processes in the industrial field.

1.3. Recommendations to take this course

The development of the subjects "Automatización e Informática Industrial" requires a previous Knowledge and strategies from other subjects related to math, physics, computer science basics, electrical basic. That is why it is advisable that the student has studied these subjects in previous curses.

2. Learning goals

2.1. Competences

On passing the subject, the student will have acquired the following competences:

(GI03) Knowledge of basic and technological subjects, enabling them to learn new methods and theories, and endow them with versatility to adapt to new situations.

(GI04) Ability to solve problems and take decisions with initiative, creativity, critical reasoning and to communicate and transmit knowledge, abilities and skills in the field of industrial engineering and in the field of electronics industrial particulary.

(GI06) The handling of specifications, regulations and mandatory standards.

(GC02) Interpret experimental data, contrast them with theorists and draw conclusions.

(GC03) Abstraction and logical reasoning.

(GC06) Adapt to quickly changing technologies.

(GC08) Locate technical information, as well as its understanding and assessment.

(GC16) Configure, simulate, build and test prototypes of electronic and mechanical systems.

(EI06) Knowledge of the fundamentals of automatism and control methods.

(EE11) Applied knowledge of industrial informatics and communications.

(EE12) Design control systems and industrial automation.

2.2. Learning goals

In order to pass this subject, students must demonstrate the following results:

- Understand concepts related to automation and industrial control.
- Configure, program and start up systems based on PLC's
- Acquire industrial communications fundaments.

2.3. Importance of learning goals

On passing the subject, the student acquires the capacity to analyze different industrial processes, revealing their main characteristics, and the student will be able to propose control solutions and choose the most suitable one in each situation.

The student will be able to propose solutions that improve or increase the effectiveness of existing systems. This clearly benefits the industrial process, obtaining results by reducing costs and/or increasing product qualities.

3. Assessment (1st and 2nd call)

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

CONTINUOUS ASSESSMENT SYSTEM

The qualifying activities are:

- Practical works proposed (all of works)
- Theorical and practical test

The subject will have been passed with 50% of the points of the different evaluation elements.

At least 80% of the live activities (laboratories, technical visits, classes, etc.) must be attended.

FINAL COMPREHENSIVE ASSESSMENT TEST

The student must opt for this modality when, due to his/her personal circumstances, he/she cannot adapt to the pace of work required in the system of continuous assessment, has failed or would like to increase his/her grade having participated in this methodology.

The evaluation criteria to be followed for the activities of the comprehensive assessment test system are as follows:

- Theory / Practical Test (100%)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

? Lectures: Theoretical activities imparted in a fundamentally expository way by the teacher, in such a way as to expose the theoretical supports of the subject, highlighting the fundamental content, structuring it in themes and relating those themes to each other.

? Practice Sessions: The teacher explains and helps in understanding the use and management of necessary software for configuring and programming control devices (PLC?s)

? Laboratory practices: Students will perform tests, measurements, assemblies, etc. in the laboratories arranged in groups, following a script provided by the teacher.

? Individual tutorials: They will be carried out in the department through personalized attention to the student, with the goal of solving the doubts and difficulties the student faces. These tutorials can be carried out either face-to-face or virtually.

If classroom teaching were not possible due to health reasons, it would be carried out on-line

4.2. Learning tasks

The course consists of 6 ECTS credits, which represent 150 hours of student?s work during the semester, which would equal to 10 hours every week during the 15 weeks the semester lasts. The degree of experimentation is deemed high.

The course includes the following learning tasks:

- 25 hours of master classes (theoretical teaching and problem solving)
- 25 hours of laboratory practice, arranged in 2-hour sessions
- 10 hours of tests (written and practical)
- 90 hours of personal studying

4.3. Syllabus

The course will address the following topics:

Theoretical / Practical contents

1.- PLC inner architecture

- RAM, ROM, ALU, PSW.
- Digital I/O
- PAE and PAA
- Brands
- Scan cycle

2.- PLC configuring and programming

- Programming languages (KOP, AWL and FUP)
- Timers and counters
- Flanks
- Arithmetical and comparison operations
- Jumps
- Functions and configurable functions
- Data blocks and function blocks.
- Organization blocks
- Built-in functions

3.- Analog inputs and outputs

4.- Industrial sensors and detectors

- Inductive and capacitive sensors
- Photocells
- Temperature, distance, pressure, etc. sensors
- Encoders (absolute and incremental)
- Load cells (strain gauges)

5.- Industrial communications and distributed control fundamentals

- Introduction to industrial communications
- Communication elements
- Physical standards
- Network topologies
- Industrial protocols

6.- Industrial buses

- MPI communications
- Decentralized periphery
- Industrial buses (basic concepts)

Practical contents

1.- Process control (discrete)

- Simulation models basic industrial processes.

2.- Three-phase asynchronous motor speed variation

Commercial inverters configuring and programming (SIMATIC MM440)

- Three-phase asynchronous motor speed control

4.4. Course planning and calendar

Face-to-face sessions calendar and project presentation

The schedule of the lectures and laboratory practices will be established by the centre at the beginning of each course. (This schedule will be published on the centre website.)

The rest of the activities (assignments hand-in, evaluation tests, etc?) will be planned according to the necessary groups and will be communicated to the students in advance at the beginning of the course

4.5. Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28831&year=2019