Universidad Zaragoza

Year : 2019/20

28836 - Advanced Automation and Control Engineering

Syllabus Information

Academic Year: 2019/20
Subject: 28836 - Advanced Automation and Control Engineering
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 424 - Bachelor's Degree in Mechatronic Engineering
ECTS: 6.0
Year: 4
Semester: Second semester
Subject Type: Optional
Module: ---

1.General information

1.1.Aims of the course

Objectives of the subject:

The main objectives of the subject can be divided into theoretical and practical types.

The theoretical contents pursue that the students know and manage in a fluent way 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 acting and the process.

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

- Configure, program and implement different types of PLC`s network via industrial buses.
- Understand and manage specific software for the configuration of HMI and SCADA system

1.2.Context and importance of this course in the degree

The subject Automatización Avanzada e Ingenieria de Control is part of the degree of Mechatronics Engineering that EUPLA teaches within the group of subjects that make up the common training module. This is a fourth course optional subjects in the second semester with an academic load of 6 credits.

This subject gives a thorough insight into the control system, industrial communications, setting of SCADA in a practical way enabling the students to analyze, develop and start-up of the different processes in the industrial field.

1.3.Recommendations to take this course

The development of the subject Automatización Avanzada e Ingenieria de Control requires knowledge and strategies learnt from other subjects related to automatization e Informatica industrial, the reason why it is advisable that the student has studied this subject in the previous semester.

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

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

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The teaching organization will be carried out following the following guidelines:

? 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 roups, 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.

4.2.Learning tasks

The course consists of 6 ECTS, 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 student's activities this semester, organized by duration are as follows:

- 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 study

4.3.Syllabus

The course will address the following topics:

Theoretical contents

1.- Industrial communications

- Physical standards
- Flow control technique
- Network topology
- Methods to access
- Networks interconnections (gateways)

2.- Industrial communication networks AS-i

3.- Industrial communication networks PROFIBUS

4.- Industrial communication networks PROFINET

5.- Introduction to supervision

- SCADA (WinccFlexible)
- Monitoring and data acquisition devices

Practical content

1.-Profibus-DP network

- PLC(s7-300) as master and ET200 as a slave
- PLC(s7-300) as master and frequency converter (MM440) as a slave

2.- WinCC flexible

- Introduction
    - Operator panels types
    - Creating a project
    - Establish connections or communication parameters
- Variables
    - Creating variables, data types and addressing
- Images
    - Creating images, System image.
    - Navigation between images.
    - Text fields.
    - Input/Output fields.:numeric, graphical and symbolic.
    - Graphic libraries.

        - Use of buttons, switches, bars and other controls.
    - Message management
    - Recipes
    - Configurations transfering.
        - Updating an operator panel's operating system.
        - Communication transferring.
    - Configuring and programming a ?Flexible Cell?
        - Grafcet.
        - Defining the different functional stages of the cell
        - Defining the different operation modes
        - SCADA system.
        - Communicating the different stages through PROFIBUS.

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=28836&year=2019