Industrial Automation

Academic Year: (2022 / 2023) **Review date: 07-11-2022**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: MALFAZ VAZQUEZ, MARIA ANGELES

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 2

OBJECTIVES

- To know the basic fundaments of the Industrial Systems.
- To know the fundaments of automation and control methods.
- The students acquire and understand the knowledge about the modelling and the automation of industrial processes by using professional hardware and software tools.
- To get the ability of modelling and simulating discrete events systems using State Diagrams and SFCs.
- To know the usual technology used in the industry for systems automation.
- To get the capacity of designing control and automation systems for discrete events systems.
- To get the ability of solving industrial processes automation problems using specific computational tools: sensors selection, actuators, modelling, and programming PLCs using professional software.
- To generate professional documentation related to simple projects.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Presentation and Introduction of the subject.
2. Discrete events system modelling.
   2.1 State Diagrams
   2.2 SFC
3. Introduction to automation technologies.
   3.1 Wiring and programmable systems
   3.2 PLC hardware.
4. PLCs programming languages
   4.1 Ladder (LD)
   4.2 Functional diagram (SFC)
5. Actuators
   5.1 Electric engines.
   5.2 Hydraulic actuators
   5.3 Pneumatic (actuators, valves, symbology)
6. Sensors
   6.1 Classification
   6.2 Features
   6.3 Types of sensors
7. Introduction to field buses.

LEARNING ACTIVITIES AND METHODOLOGY

- Theoretical lessons and doubts solving sessions in aggregated groups, tutorial support sessions and student personal work; related to the acquisition of theoretical knowledge (3 ECTS).

- Laboratory and problem solving sessions in reduced groups, tutorial support sessions and student personal work; related to the acquisition of practical abilities (3 ECTS).

ASSESSMENT SYSTEM

- Continuous assessment consist in two midterm exams:
  - Exam 1: state and functional diagrams. PLC programming. Ladder programming.
  - Exam2: a practical programming exercise will be done individually. Compulsory

attendance is required to 80% of laboratory sessions and classes in Computer Classroom to perform this exam.

- The final exam consists in several practical exercises about modelling, programming and theoretical questions. It is required to obtain a minimum mark of 3 in this final exam in order to pass the subject.

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- John, Karl-Heinz IEC 61131-3, programming industrial automation systems : concepts and programming languages, requirements for programming systems, aids to decision-making tools., *, 1995

- * International Standard IEC 1131-3. IEC., *, 1993

- Bonfatti, Flavio IEC 1131-3 programming methodology : [software engineering methods for industrial automated systems], *, 1997

- J. Balcels y J.L. Romeral Autómatas Programables, Marcombo, 2000

- Piedrafita Moreno, Ramón. Ingeniería de la automatización industrial., Ra-Ma, 2003

- R.W. Lewis Programming Industrial Control Systems Using IEC 1131-3, IEEE, 2000

ADDITIONAL BIBLIOGRAPHY

- G. Michel Autómatas Programables. Arquitecturas y Aplicaciones , Marcombo Boixareu, 1990

- Romera, Juan Pedro Automatización : problemas resueltos con autómatas programables. , Paraninfo, 2001

- V.A. Martinez Automatización con Autómatas Programables, Ra-Ma, 1991