Industrial Automation

Academic Year: (2017 / 2018) **Review date: 05/09/2017 11:00:45**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: BLANCO ROJAS, MARIA DOLORES

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 1

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.
   a. Definition of industrial automation concept
   b. Historical antecedents
   c. Continuous systems versus discrete event systems
2. Discrete events system modelling: State Diagrams and SFC. Exercise and lab clases.
   a. Basic concepts of Booleane algebra
   b. Sequential systems. The concept of a state.
   c. Graphical representation of sequential systems
   d. State Diagram Modelling. Exercise clases
   e. Petri Nets Modelling. Basic concepts.
   f. Functional Diagram (SFC) Modelling. Exercise clases
3. Introduction to automation technologies: wiring and programmable systems. PLC hardware.
4. PLCs programming languages:
   a. Ladder (LD). Exercise and lab classes
   b. Functional diagram (SFC). Exercise and lab classes
5. Actuators:
   a. Electric engines.
   b. Hydraulic actuators.
   c. Pneumatic (actuators, valves, symbology)
6. Sensors:
   a. Classification, features, etc.
   b. Sensor description
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 (2.5 ECTS).
- Laboratory and problem solving sessions in reduced groups, tutorial support sessions and

student personal work; related to the acquisition of practical abilities (3.5 ECTS).

ASSESSMENT SYSTEM

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

Continuous assessment consist in two exams:

- Exam 1: state and functional diagrams. PLC programming. Ladder programming.
- Exam2: a practical programming exercise will be done individually in the laboratory.

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.

BASIC BIBLIOGRAPHY

- Flavio Bonfatti, Paola Daniela Monari, Umberto Sampieri IEC 61131-3 Programming Methodology: Software Engineering Methods for Industrial Automated Systems, ICS Triplex, 2003

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

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