

Academic Year: (2019 / 2020)

Review date: 27-04-2020

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: BARBER CASTAÑO, RAMON IGNACIO

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Industrial Automation I
Production Systems and Automation

OBJECTIVES

To design and automated production systems and advanced control processes

DESCRIPTION OF CONTENTS: PROGRAMME

1. Automated Production Systems
 - 1.1 Production Systems. Industrial automation.
 - 1.2 Automated machines. Robotized systems.
 - 1.3 Flexible Automation Systems.
 - 1.4 Production Resource Management
- 2 PLCs I: Modeling and contact language.
 - 2.1 Modeling discrete event systems
 - 2.2 Programming Automata
 - 2.3 Ladder Language Contacts
 - 2.4 Sequential functional chart
- 3 PLCs II: Ladder Languages
 - 3.1 Structured Text Language
 - 3.2 Instruction List
- 4 PLCs III: Analog Inputs and Outputs and Function Blocks. Communications.
 - 4.1 Analog inputs and outputs
 - 4.2 Indexed addressing.
 - 4.3 Function Blocks: PID controller.
 - 4.4 Industrial Communications. Configurations.
- 5 Robotics I: Industrial Robots in Production Systems
 - 5.1 Background and Definitions
 - 5.2 Components of an industrial robot
 - 5.3 Security in industrial robots
 - 5.4 Applications of an industrial robot
- 6 Robotics II: Kinematic calculation tools.
 - 6.1 Representation of the location
 - 6.2 Homogeneous transformation matrix
 - 6.3 Application of quaternions
 - 6.4 Relations between methods
- 7 Robotics III: Rapid Programming Language
 - 7.1 Data Structure
 - 7.2 Motion Instructions
 - 7.3 Other instructions
- 8 Robotics IV: Introduction to robotics simulation
 - 8.1 Simulation Tools
 - 8.2 Introduction to RobotStudio
 - 8.3 Simulation with RobotStudio

LEARNING ACTIVITIES AND METHODOLOGY

Training activities will include:

- Lectures, which will present the knowledge that students should acquire. To facilitate their development, students will receive class notes and texts have benchmarks that will facilitate the classes and develop further work.
- Resolution of exercises by the student self-assessment that will serve you and to acquire the necessary skills.
- Lab where students experimentally verify the theoretical results and concepts seen in class.

The lectures, tutorials resolution of doubts in small groups, student presentations, tutorials and personal work, including study, tests and examinations aimed at the acquisition of knowledge will involve 3 ECTS.

ASSESSMENT SYSTEM

Continuous Assessment: 40% consist of:

- PLC Work: 30%
- Robotic Work: 10%

Final exam: 60%

The exam is divided in two parts. It is required a minimum of 3 points over 10 to pass each part. A minimum of 4 points over 10 is required to pass the full exam.

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| % end-of-term-examination: | 60 |
| % of continuous assessment (assignments, laboratory, practicals...): | 40 |

BASIC BIBLIOGRAPHY

- Benhabib, Beno Manufacturing: design, production, automation and integration, Ediciones Técnicas Izar, 2004
- REMBOLD, U., NNAJI, B.O., STORR, A.: Computer Integrated Manufacturing and Engineering, Addison-Wesley, 1993