

Academic Year: (2024 / 2025)

Review date: 25-04-2024

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)

Knowledge in Industrial Automation and Production and Automation Systems

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: Sustainable development, environmental impact, sustainable design and manufacturing

- 2 PLCs I: Modeling and contact language.
 - 2.1 Modeling discrete event systems
 - 2.2 Programming Automata
 - 2.3 Leader Language Contacts
 - 2.4 Sequential functional chart
- 3 PLCs II: literal 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.
- Realization of an automation group work that will consist of elaborating a project in which an automation process must be designed, solved and programmed.
- Carrying out an individual robotics project that will consist of solving a practical application of industrial robotics.

ASSESSMENT SYSTEM

% end-of-term-examination: 60

% of continuous assessment (assignments, laboratory, practicals...): 40

Continuous Assessment: 40% consist of:

- Automation 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.

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