Automation of industrial process - course description

General information

Course name	Automation of industrial process
Course ID	11.9-WE-AutD-AutomIndProc-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Automatic Control and Robotics / Computer Control Systems
Education profile	academic
Level of studies	Erasmus programme
Beginning semester	winter term 2017/2018

Course information

Semester	3
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Credit with grade
Laboratory	30	2	-	-	Credit with grade

Aim of the course

- To provide basic knowledge about methods of designing automated production systems
- To provide the ability to design and program diagnostic procedures for system components, devices and
- To provide the ability to design and implement control strategy of production systems
- To give basic requirements for the design of real-time systems

Prerequisites

Sensoryka i pomiary przemysłowe, programowanie w C and C++, programowanie PLC

Scope

Introduction. Technical possibilities of automation of industrial processes. Basic elements of an industrial automation system. Levels of the automation system and their tasks and requirements. Graphic representation of industrial processes. Automation in selected industries: mechanical, hydraulic, pneumatic, electric systems, etc.

Automation devices and systems, controllers used to automate industrial system . Distributed automation structures - topology, advantages and disadvantages. Automation systems with hardware and software redundancy. Representation of industrial process data in automation systems.
PLC programmable controllers - construction, applications and operating modes.

Communication in the industrial ETHERNET network. Real time systems : classification of requirements in real time systems. Concurrency of tasks and its implementation. Asynchronous and synchronous programming of real time systems. Synchronization machanisms : semaphores, monitors and critical areas. Communication between tasks (processes): shared memory and message passing. Task scheduling methods.

Teaching methods

wykład: wykład konwencjonalny

laboratorium: ćwiczenia laboratoryjne

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Can characterize the methods and devices for transmission in distributed production systems		• activity during the classes • an evaluation test	• Lecture • Laboratory
Can characterize the basic components of the production system and distinguish the levels of automation of the production process		• activity during the classes • an ongoing monitoring during classes	• Laboratory
Can design and optimize the structure of the Flexible Systems using discrete optimization methods and programming with restrictions		• a draft • an evaluation test	• Lecture • Laboratory

Outcome description	Outcome symbols	Methods of verification	The class form
Can design and write prgrams for PLC		• activity during the classes	• Laboratory
Knows the construction of PLC controllers and can give examples of their applications		• a discussion • activity during the classes • an evaluation test	• Lecture • Laboratory

Assignment conditions

Lecture – the passing condition is to obtain a positive mark from the examination.

Laboratory – the passing condition is to obtain positive marks from all laboratory exercises to be planned during the semester.

Calculation of the final grade: lecture 50% + laboratory 50%

Recommended reading

1. Sawik, T.: Supply Chain Disruption Management Using Stochastic Mixed Integer Programming. Springer, 2018

2. Patel, D. Introduction Practical PLC (Programmable Logic Controller) Programming, GRIN Verlag, 2018

Further reading

Groover, M. ,Automation, Production Systems, and Computer-Integrated Manufacturing,Pearson Education Limited, 2015

Notes

Modified by dr hab. inż. Wojciech Paszke, prof. UZ (last modification: 29-04-2020 08:24)