COURSE DESCRIPTION CARD - SYLLABUS

Course name
PLC logic controllers and PLD programmable circuits [S1Eltech1>D-PLCiPLD]

Course

Field of study
Electrical Engineering

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

The student starting this course should have basic knowledge of the basics of digital electronics and programming. He should also have the ability to obtain information from the indicated sources and be ready to cooperate as part of the team.

Course objective

Getting to know the principles of operation, operation and broadly understood programming of PLC controllers and PLD programmable logic systems. Acquisition of the ability to design industrial automation systems and extensive digital systems.

Course-related learning outcomes

Knowledge:
1. Has knowledge of development trends, new achievements and dilemmas of modern engineering.

Skills:
1. Can obtain information from literature, databases and other sources, make their interpretation, evaluation, critical analysis and synthesis, as well as draw conclusions and formulate and exhaustively justify opinions.
2. Can formulate and test hypotheses related to engineering problems and simple research problems, develop detailed documentation of the results of the experiment, design task, interpret the obtained results and draw conclusions

Social competences:
1. Recognizes the importance of knowledge in solving cognitive and practical problems and understands that in technology, knowledge and skills quickly become obsolete and therefore require constant replenishment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
The knowledge acquired during the lecture is verified by one 45-minute test carried out during the last lecture. Passing threshold: 50% of points. Final issues, on the basis of which the questions are developed, will be sent to students by e-mail using the university"s e-mail system.
The skills acquired during the laboratory classes are verified on the basis of a final test, consisting of tasks with different scores depending on the degree of their difficulty. Passing threshold: 50% of points.
The skills acquired during the project classes are verified on the basis of the final project. Teamwork is possible in the case under consideration..

Programme content

Application possibilities of PLC systems, architecture of programmable industrial controllers and their classification, characteristics of the program cycle of programmable logic controllers, programming languages, characteristics of basic expansion modules of PLC controllers, communication protocols, HMI, the concept of programmable electronic systems PLD, programming languages of PLD systems, optimization processes in PLD systems .

Course topics

Issues carried out during the lecture: concepts of real-time system and programmable PLC controllers, application possibilities of PLC systems, architecture of programmable industrial controllers and their classification, programmable logic controllers program cycle characteristics, PLC commissioning tools, programming languages (LAD, STL, FBD), characteristics basic expansion modules for PLC controllers, complex systems of programmable logic controllers, communication protocols, visualization and control of automation processes from a PC, operation of impulse and analog inputs / outputs, subsystem structures of regulators, principles of designing digital electronic systems, ORCAD / PSpice software package and libraries of electronic circuits created by their producers, the concept of programmable electronic circuits PLD, programming languages of PLD circuits and commissioning tools, combinational circuits and se coefficient in PLD systems, optimization processes in PLD systems.
Issues carried out during the laboratory: a commissioning tool and programming languages of PLC and PLD systems, implementation of algorithms using selected languages in PLC and PLD systems, use of combinational and sequential systems, programming and handling of HMI PLCs.
Issues carried out during the pro-project classes: development and implementation of algorithms that perform selected tasks in PLC and PLD systems, checking the correctness and optimization of the code, functional tests of systems..

Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given on the board.
2. Laboratory exercises: a multimedia presentation, a presentation illustrated with examples given on the blackboard and carrying out the tasks given by the teacher - practical exercises.
3. Design classes: carrying out a design task in stages under the supervision of the teacher.

Bibliography

Basic

Technical documentation of selected PLC controllers

Technical documentation of selected programmable logic devices PLD

Kwaśniewski J., Sterowniki PLC w pracy inżynierskiej, PTC, Kraków 2008.

Legierski T., Programowanie sterowników PLC, WPKJS, Gliwice 1998.

Zieliński T.P., Cyfrowe przetwarzanie sygnałów. Od teorii do zastosowań, Wydawnictwa Komunikacji i Łączności, Warszawa 2009.

Zbysiński P., Pasierbiński J.: Układy programowalne, pierwsze kroki, BTC, Warszawa 2004

Pawluczuk: A. Układy programowalne dla początkujących, BTC, Warszawa 2007

Materiały edukacyjne Mathworks: https://www.mathworks.com/

Additional

Izydorczyk J. i inni, Matlab i podstawy telekomunikacji, Wydawnictwo Helion, 2017.

Mrozek B., Mrozek Z., MATLAB i Simulink. Poradnik użytkownika. Wydanie IV, Wydawnictwo Helion, 2017

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	90	4,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00