COURSE DESCRIPTION CARD - SYLLABUS

Course name
PLC controllers and SCADA in measurement and industrial automation [S2Eltech1E-ISP>PLC]

Course

Field of study
Electrical Engineering

Year/Semester
2/3

Area of study (specialization)
Smart Measurement Systems

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

The student starting this course should have basic knowledge of electrotechnics, metrology and computer science and electronics, including electronic, analog, digital and microprocessor systems. He should also have the ability to effectively self-educate in the field of PLC programming and have the ability to work in a laboratory group.

Course objective

Extending the knowledge of programming PLC controllers with emphasis on issues related to visualization and remote access to the PLC managed control system. Providing students with detailed knowledge of programming PLCs and SCADA systems and familiarization with interdisciplinary achievements in the field of their use for industry. Presenting students an alternative method of visualizing the control processes of a system based on a PLC controller.

Course-related learning outcomes

Knowledge:
1. Has in-depth knowledge of the construction and design of complex electrical systems, in particular measurement and control systems, knows the basic processes occurring in the life cycle of technical

systems.
2. Has extended knowledge in the field of measurements of electrical quantities and selected non-electrical quantities.
3. Has extended knowledge of computer-aided design in electrical 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 work individually and in a team, can manage a team in a way that ensures the implementation of the task within the set deadline.
3. Can formulate a design specification of a complex and unusual electrical device or system, taking into account legal aspects, including intellectual property protection, and other non-technical aspects.

Social competences:
1. Is aware of the need to develop professional achievements and observe the rules of professional ethics, fulfill social obligations, inspire and organize activities for the benefit of the social environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Project:
Continuous assessment during each class, assessment of knowledge and skills related to the implementation of a group project or individual control system using a PLC controller and SCADA, assessment of the report on the project.

Programme content

Project:
Basics of programming and communication of PLC controllers. Construction of measurement systems using PLC controllers and SCADA systems. The use of open source software as an alternative method of visualizing control processes

Course topics

Project:
1. PLC programming languages.
2. Basics of programming, communication of controllers.
3. Use of open source software as an alternative method of visualization of control processes
4. Construction of measuring systems with the use of PLC controllers and SCADA system.
5. Examples of programming measurement systems using PLC controller and SCADA system.

Teaching methods

Project: Multimedia presentations supplemented with examples given on the board and project implementation.

Bibliography

Basic:
1. A. Hulewicz, Z. Krawiecki, K. Dziarski: Distributed control system DCS using a PLC controller, ITM Web Conf., Computer Applications in Electrical Engineering, Volume 28, 2019, s. https://doi.org/10.1051/itmconf/20192801041.
2. A. Hulewicz, Z. Krawiecki, Sterownik PLC i panel operatorski w układzie automatyki inteligentnego budynku, , Poznan University of Technology Academic Journals, Electrical Engineering, No 92, Poznań 2017, s. 345-354.
3. T. Gilewski., Podstawy programowania sterowników SIMATIC S7 1200 w języku LAD, BTC, Warszawa 2017.
4. R. Sałat, K. Korpysz, P. Obstawski, Wstęp do programowania sterowników PLC, WKŁ, Warszawa 2010.
5. A. Król, J. Moczko-Król, S5/S7 Windows Programowanie i symulacja sterowników PLC firmy Siemens, Nakom, Poznań 2002.

6. J. Kasprzyk, Programowanie sterowników przemysłowych, WNT, Warszawa 2006.

Additional:
1. Hulewicz A., Krawiecki Z., Parzych J., Przykłady niekonwencjonalnych zastosowań sterowników PLC, Poznan University of Technology Academic Journals, Electrical Engineering, No 91, Poznań 2017, s. 81-92.
2. U. Tietze, Ch. Schenck, Układy półprzewodnikowe, WNT, Warszawa 2009.
3. J. Bogusz, Lokalne interfejsy szeregowe w systemach cyfrowych, Wyd. BTC, Warszawa 2004.

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50