COURSE DESCRIPTION CARD - SYLLABUS

Course name
Industrial automation systems [S2Eltech2-UEPP>UAP]

Course

Field of study
Electrical Engineering

Year/Semester
2/3

Area of study (specialization)
Electrical Systems in Industry and Vehicles

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Has in-depth knowledge of the construction and design of electrical systems, in particular measurement and control systems, knows basic information about PLCs and microcontrollers.

Course objective

Provide students with basic knowledge of programming and application of programmable controllers for industrial process control.

Course-related learning outcomes

Knowledge:
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.

Skills:
Can - when formulating and solving unusual engineering tasks and simple research problems - use a system approach, take into account non-technical aspects, use information and communication

methods and tools.

Social competences:
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:

Lecture:
- assessment of the knowledge and skills shown in the problem-based written test, carried out during the last lecture (90 min.).
Laboratory:
- checking and awarding the knowledge necessary to implement the problems posed in a given area of laboratory tasks,
- evaluation of the implemented project; Project topics are distributed to students during 4 laboratory classes; Projects are carried out in groups of 2-3 people; The project concerns writing the control of a selected process or part of a technological process.

Programme content

The use of automatic control systems in industry.

Course topics

Lecture:
Introduction to control issues: the concept of control, implementation of digital control of industrial processes, control system with a programmable controller, implementation of the control algorithm, input measurement and status signals, output control signals, classifications of programmable controllers. Construction and operation of the controller and programmer. Programming languages: ladder (LD), structured (ST), instruction lists (IL), function blocks (FBD), sequential programming (SFC). Application of digital regulators.
Laboratory:
- familiarization with dedicated laboratory sets containing a PLC controller,
- overview of programming tools,
- creating a project, hardware configuration, writing an elementary program in the selected programming language, testing the program, archiving the project,
- use of basic logic operations, timers, comparators, flip-flops, use of DI, DO, AI, AO,
- selection of sensors and measuring transducers,
- use of PID controllers,
- design of the control of a selected technological process in industry.

Teaching methods

Lecture:
Multimedia presentation, presentation illustrated with examples given on the board.
Laboratory:
Introduction to the task, programming the task and its verification with the use of dedicated laboratory sets and software, testing the results of the program.

Bibliography

Basic:
1. Kasprzyk J., Programowanie sterowników przemysłowych., WNT, Warszawa, 2006.
2. Gilewski T, Szkoła programisty PLC : sterowniki przemysłowe, Wydawnictwo Helion, Gliwice, cop. 2017, ISBN: 978-83-283-3082-5.
3. SIMATIC, Programming with STEP7, Manual, Wydanie 5/2010, Siemens A.G.
4. Ladder Logic (LAD) for S7-300 and S7-400 Programming, Reference Manual, 6ES7810-4CA10-8BW1, 05.2010, Siemens A.G.

Additional:
1. Simatic S7 Programowalny sterownik S7-1200, Podręcznik systemu, Wydanie 4/2009, Siemens A. G.
2. J. Kwaśniewski. Programowalny sterownik SIMATIC S7-300 w praktyce inżynierskiej, Wydawnictwo BTC, Legionowo 2009.
3. J. Kwaśniewski, Sterowaniki PLC w praktyce inżynierskiej, Wydawnictwo BTC, Legionowo 2008.
4. J. Kwaśniewski. Programowalne sterowniki przemysłowe w systemach sterowania, Wydawnictwo Katedra Automatyzacji Procesów AGH, Kraków 1999.

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00