COURSE DESCRIPTION CARD - SYLLABUS

Course name
Application of PLC's in process automation [S1Elmob1>PO5-SPLCwAP]

Course

Field of study
Electromobility

Year/Semester
3/6

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
30

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

Knowledge - the student beginning this course should have basic knowledge of the basics of digital electronics, programming and automation, should also have the ability to obtain information from indicated sources and have the willingness to cooperate in a team. Skills - the ability to effectively self-educate in the field related to the chosen field of study; the ability to make appropriate decisions in solving simple tasks and formulating problems in the field of PLC programming. Competences - the student is aware of extending his competences, demonstrates readiness to work in a team, ability to comply with the rules binding during lectures and laboratory classes.

Course objective

Familiarization with the concepts of real-time systems and PLCs, familiarity with the architecture of PLCs, familiarity with PLC programming languages, acquiring the ability to operate and configure PLCs and to develop and implement algorithms that perform various functions, with particular emphasis on applications dedicated to broadly defined electromobility.

Course-related learning outcomes

Knowledge:
1. The student should have knowledge of construction and principles of operation of programmable logic controllers PLC.
2. The student should have knowledge of selected programming languages used to implement the developed control algorithms. 3.
3. The student should know basic concepts connected with configuration and operation of HMI (human machine interface).

Skills:
1. The student will be able to apply his knowledge about the construction and principles of operation of PLCs and industrial servo drives for implmenting technical tasks.
2. The student will be able to develop and implement control algorithms in selected PLC programming languages.
3.The student will be able to program selected drive applications using standardized PLC OPEN Motion Control function blocks.

Social competences:
1.The student understands the importance of knowledge in solving problems and improving professional, personal and social competences.
2.The student is aware that in technology knowledge and skills become obsolete very quickly.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
- evaluation of knowledge and skills demonstrated in the solved written test of a problematic nature,
- continuous assessment, activity and substantive content of the speech is rewarded.
Project:
-the project classes are graded on the basis of ongoing progress control, activity in class
- realization of the final project carried out in groups of several people.
Laboratory:
- verification on the basis of completed reports,
- continuous evaluation, the activity and the substantive content of the statements are rewarded.

Programme content

The concept of a PLC controller. Program cycle of PLC controllers. Programming languages and development tools for logical controllers. Closed regulation systems.

Course topics

Lecture:
The definition of a PLC and its applications (with particular emphasis on vehicles, e.g. in on-board automation systems), selected PLC programming languages, operation of timing and counting systems in PLCs including the so-called fast counters (dedicated to work with various types of encoders), operation of interrupt systems in PLCs, impulse outputs in PLCs, closed-loop control systems (algorithms of regulators in PLCs),servo drive operation control based on PLCs, HMI (Human Machine Interface) based on PC platforms as well as dedicated hardware platforms (e.g. operator panels), the definition of an industrial computer (construction, specification, requirements), network communication in PLC systems, PACs, their application, algorithm implementation.

Teaching methods

Lecture: presentation of issues with the use of multimedia, illustrated by examples given on the blackboard, discussion of problematic issues, results of simulation models.
Project: work in teams, use of catalog data and tools that enable students to perform the tasks at home, development of project documentation.
Laboratory: performing laboratory exercises in teams (preparing the stand, building measurement

systems, performing experiments) with the help and under the control of the instructor, the study of simulation and experimental models - comparison of obtained results.

Bibliography

Basic:
1. Dokumentacja techniczna wybranych sterowników PLC oraz serwonapędów
2. Kwaśniewski J., Sterowniki PLC w pracy inżynierskiej, PTC, Kraków 2008.
3. Legierski T., Programowanie sterowników PLC, WPKJS, Gliwice 1998.
4. Zieliński T.P., Cyfrowe przetwarzanie sygnałów. Od teorii do zastosowań, Wydawnictwa Komunikacji i Łączności, Warszawa 2009.
5. Sałat R., Korpysz K., Obstawski P., Wstęp do programowania sterowników PLC, WKŁ,2014.

Additional:
1. Normy dotyczące języków programowania sterowników PLC
2. Dokumentacja standardu PLC Open Motion Control
3. Internet: specialist subject literature, datasheets, standards.

Breakdown of average student's workload

	Hours	ECTS
Total workload	152	6,00
Classes requiring direct contact with the teacher	77	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	75	3,00