COURSE DESCRIPTION CARD - SYLLABUS

Course name
Programming of industrial drive applications [S1Elmob1>PO5-PPAN]

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

To acquire knowledge and skills for programming industrial drive systems. Learning the concepts of real-time systems and PLCs, getting acquainted with the architecture of PLCs, learning 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. has knowledge of construction and principles of operation of programmable logic controllers PLC. 2.
2. has knowledge of selected programming languages used to implement the developed control algorithms. 3.
3 knows basic concepts connected with configuration and operation of industrial drive systems.

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:

Lectures:
- evaluation of knowledge and skills presented in the written exam,
- frequent appraisal during exercise classes (the awarding student activity).
Laboratory classes:
- test and awarding knowledge during realization of laboratory classes,
- evaluation of student activity and appraisal both of increase of his knowledge, skills and social competences connected withvactivities in teamwork,
- evaluation of knowledge and skills related to the individual laboratory class, appraisal of the report.
Project:
Passing the project classes is based on the ongoing monitoring of progress, activity in the classroom and the implementation of the final project carried out in subgroups of several people. The final grade will take into account the activity during the project classes.

Programme content

The lecture and laboratory programme covers PLCs and programming languages, network communications, HMIs, servo drives and control systems.

Course topics

Construction and principle of operation of programmable logic controllers (PLC), operation cycle of a PLC, input and output circuits of controllers, programming languages, basics of ladder language programming. Construction and principles of operation of selected sensors and measuring devices used in automation and robotics. Timing and counting systems operation in PLCs including so called fast counters (dedicated for cooperation with angular position transducers), interrupt system operation in PLCs, pulse outputs operation in PLCs, closed-loop control systems (regulator algorithms in PLCs). Servo drive, structure, parameters and requirements. Drive application programming methods using standardized function blocks compatible with PLC Motion control. Contemporary development trends in developing and programming drive applications.
Laboratory: Practical exercises on the knowledge imparted in the lecture. Programming of applications controlling selected technological processes. Control of drive applications.
Project: execution of a user interface design for process control of an industrial device on an HMI panel.

Teaching methods

Lecture: multimedia presentation (including: figures, photos, animations, films) supplemented with examples given on the board.

Project: working in teams, using provided instructions and tools that enable students to perform tasks at home developing project documentation.

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