



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

PLC controllers and SCADA systems in measurement and control

### Course

Field of study

Electrical Engineering

Area of study (specialization)

Elektronika, pomiary i technika świetlna

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

Polish

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

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Faculty of Control, Robotics and Electrical

Engineering

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Responsible for the course/lecturer:

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### Prerequisites

The student starting this subject should know basic knowledge in the scope of electrotechnics, metrology and computer science and basic knowledge in the scope of electronics, including electronic analog and digital circuits. Should ability of the efficient self-education within the scope of PLC controllers programming and willingness to cooperate in a team.

### Course objective

Providing students with basic knowledge of programming of the selected PLC controllers and knowledge of interdisciplinary achievements related to industrial applications of PLC controllers

### Course-related learning outcomes

Knowledge

1. Ability to describe importance and application possibilities of the modern measuring systems



2. Ability to explain the principles and techniques of measuring signal acquisition for industrial applications

#### Skills

1. Ability to work independently and as a team in the design and construction companies as well as in the industrial centres
2. Ability to design the measuring systems creatively, using possibilities offered by new technologies

#### Social competences

1. Ability to think and act enterprisingly in the area of measuring systems used in industry

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified by a 45-minute colloquium carried out during the 8th lecture. The test consists of 6-8 questions (open), variously scored. Passing threshold: 50% of points. Final issues on the basis of which questions are developed will be made available to students in the Moodle system.

Skills acquired as part of the laboratory are verified during each class on the basis of programmed mockups using PLC and HMI and a final test in 15 laboratories consisting in the implementation of a given program task. Passing threshold: 50% of points.

Skills acquired as part of the project are verified on the basis of the developed and made project of an exemplary control system using a PLC and SCADA system.

#### Programme content

##### Lectures:

1. Structure of the measuring systems using PLC controllers, HMI panels and SCADA systems.
2. Programming languages of PLC controllers: graphic and text.
3. Fundamentals of programming, operations on the data, signal processing, controllers communications.
4. Examples of measuring systems configurations with the use of a PLC controller, HMI panel and SCADA system.

##### Laboratory:

1. Construction of control systems using PLC controllers and HMI panels.
2. Examples of programming control systems using a PLC and HMI panels.

##### Project:

1. Construction of measuring systems using PLC controllers and SCADA system.



2. Examples of programming measuring systems using a PLC and SCADA systems

### Teaching methods

Lectures: Multimedia presentations expanded by examples shown on a board.

Laboratory: Multimedia presentations expanded by examples shown on a board and realization of experiments

Project: Multimedia presentations expanded by examples shown on a board and realization of project.

### Bibliography

#### Basic

1. 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.
2. T. Gilewski., Podstawy programowania sterowników SIMATIC S7 1200 w języku LAD, BTC, Warszawa 2017.
3. R. Sałat, K. Korpysz, P. Obstawski, Wstęp do programowania sterowników PLC, WKŁ, Warszawa 2010.
4. A. Król, J. Moczko-Król, S5/S7 Windows Programowanie i symulacja sterowników PLC firmy Siemens, Nakom, Poznań 2002.
5. 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 szeregowo w systemach cyfrowych, Wyd. BTC, Warszawa 2004.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	70	3,0

<sup>1</sup> delete or add other activities as appropriate