



COURSE DESCRIPTION CARD - SYLLABUS

Course name

SCADA systems and PLCs in the industry [S1Eltech1P>C-SCADAwP]

Course

Field of study Electrical Engineering	Year/Semester 3/6
Area of study (specialization) –	Profile of study practical
Level of study first-cycle	Course offered in Polish
Form of study full-time	Requirements elective

Number of hours

Lecture 0	Laboratory classes 30	Other (e.g. online) 0
Tutorials 0	Projects/seminars 15	

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of electrical engineering, electronics and computer science. Basics of programming in C, Pascal or other high-level language. Is aware of the need to expand their competences, readiness to cooperate within a team.

Course objective

The objective of the course is to familiarize students with the principles of designing, constructing and operation of a control and a visualization system, configuration of the elements of a system and capabilities of SCADA environments. Another objective is getting familiar with the possibility to work in simulation mode and with a real object monitored by PLC driver. Design his own visualization and control project. Presentation of solution.

Course-related learning outcomes

Knowledge:

1. has elementary knowledge in the field of using IT tools in SCADA systems, programming in dedicated languages, designing signal transmission networks and using databases,
2. has elementary knowledge about the construction, operation principles and selection of PLC controllers (including simulated ones) cooperating with SCADA visualization and control systems,
3. has basic and systematic knowledge in the field of design and programming of microprocessor systems and PLC controllers used in industrial process control.

Skills:

1. is able to formulate a process control algorithm and implement it using appropriate programming languages,
2. can simulate real working conditions and industrial process parameters using the SCADA system,
3. knows how to correctly select design assumptions and make presentations showing the characteristics of the designed SCADA system.

Social competences:

1. is aware of the importance of own and team work, can be responsible for implemented project tasks.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Skills acquired as part of the laboratory are verified on the basis of: assessing activity during each class, rewarding the increase in the ability to use known principles and methods, verification of skills during the completion of the project.

Project classes are assessed on the basis of: implementation and presentation of the project visualization and control of the selected process along with project documentation, cooperation skills within the team that practically implements the project task, presentation of current progress in project implementation.

Programme content

The module program includes issues related to practical learning of design, programming and practical use of SCADA systems (visualization, control and data acquisition).

Course topics

The laboratory program includes the following issues:

Configuring communication with external devices, creating synoptic screens, defining variables, configuring alarms, charts (trends), recording events - logs, programming elements, securing the system against unauthorized access (configuration users and authorization system), handling events, reports, keyboard shortcuts, working with a real industrial controller and becoming familiar with other selected elements of the SCADA system. Introducing modern application solutions used in practice.

The project class program covers the following topics:

Implementation of an individual/team project with ongoing presentation of assumptions and progress in implementation, in the field of visualization and control of industrial processes. Using students' knowledge from other subjects, initiating discussions, asking questions to increase students' activity and independence.

Teaching methods

Laboratories: practical knowledge of the functionality and capabilities of the SCADA system, computer classes covering the scope of the topic.

Projects: The use of computer and multimedia equipment with dedicated software to present current progress in the implementation of final projects.

Bibliography

Basic

1. Cupek R., Metody wizualizacji rozproszonych procesów przemysłowych. Praca doktorska, PŚ, Gliwice, 1998.
2. Marciniak P., Wprowadzenie teoretyczne do systemów SCADA, Self Publishing, 2013.

3. Jakuszewski R., Programowanie systemów SCADA., Gliwice, 2006.

Additional

1. Kościelny J. M., Systemy nadzorowania i wizualizacji procesów przemysłowych ? wymagania, kryteria oceny, PW, Warszawa, 1998.

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

3. Schneider Electric, Vijeo Citect 7.1, 7.2 - Pierwsze kroki, Instytut Szkoleniowy Schneider Electric, Warszawa.

4. Broel-Plater B., Układy wykorzystujące sterowniki PLC. Projektowanie algorytmów sterowania, Wydawnictwo Naukowe PWN SA, Warszawa, 2008.

5. Kwaśniewski J., Sterowniki PLC w praktyce inżynierskiej, Wydawnictwo BTC, Legionowo, 2008.

6. Kamiński K., Programowanie układów sterowania z PLC, Wydawnictwo Krzysztof Kamiński, Gdynia 2009.

7. Nowak R., Pietrasz A., Trzmiel G., The control and visualisation system in an intelligent building, ITM Web Conf., vol. 19 (01041), 2018, <https://doi.org/10.1051/itmconf/20181901041>.

8. Trzmiel G., Control and visualisation of the selected industrial processes with the application of SCADA system, Monograph Computer Applications in Electrical Engineering, Poznan University of Technology 2015, vol. 13, pp. 161 - 177.

9. Kurz D. Łopatka M., Trzmiel G., The use of the SCADA system in the monitoring and control of the performance of an autonomous hybrid power supply system using renewable energy sources, E3S Web of Conferences, vol. 44, 2018 (00180), <https://doi.org/10.1051/e3sconf/20184400180>.

10. Głuchy D., Possibilities of use of the SCADA system for control and visualization of the RES operation, Post-conference Monograph „Computer Applications in Electrical Engineering”, vol. 14, 2016, Poznań, Polska, str. 340-351.

11. CiTechnologies: System pomocy środowiska CitectSCADA., 2006-2012.

12. Internet: specialist subject literature, datasheets, standards.

Breakdown of average student's workload

	Hours	ECTS
Total workload	76	3,00
Classes requiring direct contact with the teacher	36	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	2,00