STUDY MODULE DESCRIPTION FORM

Name of the module/subject **SCADA systems and PLCs**		Code **1010322331010326004**
Field of study **Electrical Engineering**	Profile of study (general academic, practical) **(brak)**	Year /Semester **2 / 3**
Elective path/specialty **Electrical and Computer Systems in**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **15** Classes: **-** Laboratory: **-** Project/seminars: **15**		No. of credits **3**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **3 100%** **3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of electrical engineering, electronics, computer science and automation. It has an elementary knowledge of the structure, operation, selection and PLC programming.
2	**Skills**	Basics of programming in C, Pascal or other high-level language. He can formulate process control algorithm and select design objectives.
3	**Social competencies**	He is aware importance of their own work and teamwork, he can take over responsibility for the performed design tasks.

Assumptions and objectives of the course:

Introduction to the principles of design, construction and operation of the control and visualization system, configuration of system components and the possibility of SCADA environments. Knowing with the possibility of simulation mode and particularly with the real object controlled by the PLC.

Implementation of own project and documentation using a PLC.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. he has extended knowledge in the use of IT tools in SCADA systems, designing and programming the PLC algorithms used in industrial process control - [K_W08+++]

2. he has a systematic knowledge of current achievements and trends in the development of the theory of control and visualization of industrial processes - [K_W04+]

Skills:

1. he can lead and supervise the work of the project team in the quest for effective implementation of the task - [KU_02+++]

2. he can develop a complete documentation of the project - [KU_03++]

3. he can formulate objectives and specification of the project cooperation of the device with PLC and SCADA systems in accordance with current rules and regulations - [KU_11++]

Social competencies:

1. he takes efforts to accurately and clearly present the achievements in the field of SCADA systems with PLCs, presenting several possible potential design solutions - [K_K02++]

Assessment methods of study outcomes

Lectures:

- verification of knowledge necessary during the course of the project during the semester,
- passing the written test in the last lecture.

Projects:

- execution of the visualization and control design of the selected process utilizing the cooperation with the PLC,
- ability to cooperate within the team practically performing the project task.

Course description

Applied methods of teaching: lectures: 15 h., projects: 15 h.

The lecture is characteristic of SCADA systems with a special focus the practical aspects of the principles of operation, configuration, and operation of selected components. Within the expanded project activities is realized within the theme of the course for full-time undergraduate (1st degree) studies, mainly for co-operation the system with real PLC. The focus is directed to present possibilities, principles and universality of exchange of information between the SCADA system and any PLC.

Project: Individual/team project based on PLC and SCADA software cooperation. Performing the design for the project.

Use students' knowledge of other subjects, initiate discussions, ask questions to increase student activity and autonomy.

Use of software to enable students to perform home tasks (DEMO mode with virtual drivers and real simulation). Classes at the university supplemented by materials for self-employment on free software packages.

Updated 2017: Working on the latest version of Citect SCADA 2016 software, introducing modern application solutions used in practice.

Basic bibliography:

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 bibliography:

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., Control and visualisation of illumination and irrigation processes, Monograph Computer Applications in Electrical Engineering, Poznan University of Technology 2016, vol. 14, pp. 469 ? 484.
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. Głuchy D., Kurz D., Trzmiel G., Wykorzystanie systemu SCADA w sterowaniu pracą elektrociepłowni, Computer applications in electrical engineering vol. 82/2015, Poznan University of Technology Academic Journals ? Electrical Engineering, Poznań, 2015, str. 21 ? 30.
10. CiTechnologies: System pomocy środowiska CitectSCADA., 2006-2012
11. Diploma papers.
12. Internet.

Result of average student's workload

Activity	Time (working hours)
1. participation in lectures	15
2. participation in project activities	15
3. the consulting	10
4. analysis of the literature exploring the topics of lectures	15
5. preparation for the pass of the lecture	5
6. preparation for the pass the project	10
7. reckoning of projects	2

Student's workload

Source of workload	hours	ECTS
Total workload	72	3

Contact hours	42	2
Practical activities	37	1