FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Systemy sterowania i nadzoru w energetyce**
Name in English:	**Control and monitoring systems in the power industry**
Main field of study (if applicable):	**Electrical Engineering**
Specialization (if applicable):	**Electrical Power Engineering**
Level and form of studies:	**2nd level, part-time**
Kind of subject:	**obligatory**
Subject code:	**ELR052580**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):				22	
Number of hours of total student workload (CNPS):				60	
Form of crediting:				crediting with grade	
For group of courses mark (X) final course:					
Number of ECTS points:				2	
including number of ECTS points for practical (P) classes :				2	
including number of ECTS points for direct teacher-student contact (BK) classes:				1.40	

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knows principles of operation of power system and power stations as well as technologies of power generation and transmission
2. Has knowledge about dynamics, statistics and quality and stability of automatics

SUBJECT OBJECTIVES

C1. Practical skills of analyzing and developing control systems for power plants and energy systems

C2. Acquaintance with designing structures and algorithms of Distributed Control Systems (DCS) used to control set of equipment being part of the system / technology process, including configuration control algorithms and regulation, monitoring, visualization, recording and archiving parameters and simulation

SUBJECT LEARNING OUTCOMES

relating to knowledge:

relating to skills:

PEU_U01	Is able to describe the major features of a Distributed Control System (DCS)
PEU_U02	Is able to create a database of the DCS control functions and design procedure for sequential control
PEU_U03	Is able to carry out a complex engineering project in a competent way, unaided, undertaking multi-criteria analysis

relating to social competences:

PEU_K01	Understands the need to develop interdisciplinary knowledge, develop the ability to apply knowledge and skills in the implementation of complex tasks engineering and cooperation in a group

PROGRAMME CONTENT		
Form of classes - project		**Number of hours:**
Proj 1	Introduction. Setting rules of course crediting. Acquaintance with lab stands and available software	2
Proj 2	DCS system hardware configuration - part 1	2
Proj 3	DCS system hardware configuration - part 2	2
Proj 4	DCS system hardware configuration - part 3. Distribution of the design assumptions and discuss how to develope the project	2
Proj 5	Designing a DCS for a typical set of equipment being part of the system / technological process including the configuration of the control algorithms and regulation, monitoring, visualization, recording and archiving parameters and process simulation: circulating water pumping system, water supply pumping system, air and flue gas fans system, auxiliaries system of a power station, a conveyor system carburizing, coal conveyor belt system, coal pulverizer/mill system fuel economy (pumping light oil) - part 1	2
Proj 6	Designing a DCS for a typical set of equipment being part of the system / technological process including the configuration of the control algorithms and regulation, monitoring, visualization, recording and archiving parameters and process simulation: circulating water pumping system, water supply pumping system, air and flue gas fans system, auxiliaries system of a power station, a conveyor system carburizing, coal conveyor belt system, coal pulverizer/mill system fuel economy (pumping light oil) - part 2	2
Proj 7	Designing a DCS for a typical set of equipment being part of the system / technological process including the configuration of the control algorithms and regulation, monitoring, visualization, recording and archiving parameters and process simulation: circulating water pumping system, water supply pumping system, air and flue gas fans system, auxiliaries system of a power station, a conveyor system carburizing, coal conveyor belt system, coal pulverizer/mill system fuel economy (pumping light oil) - part 3	2
Proj 8	Designing a DCS for a typical set of equipment being part of the system / technological process including the configuration of the control algorithms and regulation, monitoring, visualization, recording and archiving parameters and process simulation: circulating water pumping system, water supply pumping system, air and flue gas fans system, auxiliaries system of a power station, a conveyor system carburizing, coal conveyor belt system, coal pulverizer/mill system fuel economy (pumping light oil) - part 4	2
Proj 9	Designing a DCS for a typical set of equipment being part of the system / technological process including the configuration of the control algorithms and regulation, monitoring, visualization, recording and archiving parameters and process simulation: circulating water pumping system, water supply pumping system, air and flue gas fans system, auxiliaries system of a power station, a conveyor system carburizing, coal conveyor belt system, coal pulverizer/mill system fuel economy (pumping light oil) - part 5	2
Proj 10	Designing a DCS for a typical set of equipment being part of the system / technological process including the configuration of the control algorithms and regulation, monitoring, visualization, recording and archiving parameters and process simulation: circulating water pumping system, water supply pumping system, air and flue gas fans system, auxiliaries system of a power station, a conveyor system carburizing, coal conveyor belt system, coal pulverizer/mill system fuel economy (pumping light oil) - part 6	2
Proj 11	Accounting for the executed projects	2
	Total hours:	**22**

TEACHING TOOLS USED
N1. DCS class master systems
N2. Project presentation

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation *F – forming (during semester)* *P – concluding (at semester end)*	**Educational effect number**	**Way of evaluating educational effect achievement**
F1(P)	PEU_U01 PEU_U02	Activity during the classes
F2(P)	PEU_U03 PEU_K01	Presentation of the project done
P(P)	P=0,3F1+0,7F2	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Rozproszony system sterowania Freelance: http://new.abb.com/control-systems/pl/essential-automation/freelance/strony-dodatkowe/korzysci
[2] Synal B., W. Rojewski W., Dzierżanowski W.: Elektrenergetyczna automatyka zabezpieczeniowa. Podstawy, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2003
[3] Winkler W., Wiszniewski A.: Automatyka zabezpieczeniowa w systemach elektroenergetycznych. WNT, Warszawa 1998.
[4] Machowski J. Regulacja i stabilność systemu elektroenergetycznego. Warszawa , WNT, 2007.
[5] Paska J., Wytwarzanie energii elektrycznej, Wydawnictwo: OWPW
[6] Pawlik M.: Elektrownie. WNT, Warszawa 2009.

SECONDARY LITERATURE:

[1] Rebizant W., Szafran J., Wiszniewski A., Digital signal processing in power system protection and control, Springer, London 2011.
[2]P. Tatjewski: Advanced Control of Industrial Processes. Springer, London 2007.

SUBJECT SUPERVISOR

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