

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Inteligentne instalacje budynków i obiektów**  
 Name in English: **Intelligent buildings and structures installations**  
 Main field of study (if applicable): **Control Engineering and Robotics**  
 Specialization (if applicable): **Automation of Machines, Vehicles and Apparatus**  
 Level and form of studies: **2nd level, full-time**  
 Kind of subject: **optional**  
 Subject code: **ARR042316**  
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	30			15	
Number of hours of total student workload (CNPS):	60			30	
Form of crediting:	examination			crediting with grade	
For group of courses mark (X) final course:					
Number of ECTS points:	2			1	
including number of ECTS points for practical (P) classes :				1	
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40			0.70	

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. He has a basic knowledge concerning the electrical installations of municipal buildings.
2. He knows how to use basic computer hardware and software.
3. He can obtain information from literature, databases and other sources.
4. He understands the need of continuous education and knows possibilities of improving professional, personal and social competencies.

**SUBJECT OBJECTIVES**

- C1. Acquiring general knowledge regarding the planning of electrical installations in municipal buildings and getting to know of basic principles of the functioning and organization of building automation as a part of intelligent building.
- C2. Acquiring knowledge in the field of topology, physical and logical structure of chosen solutions of intelligent installation systems.
- C3. Getting to know of basic software tools used for configuration of selected building automation systems.
- C4. Acquiring detailed knowledge and skills in planning simple arrangements of intelligent installations in chosen building automation systems with using products of various manufacturers.
- C5. Getting to know broad principles of design of electrical installations in municipal buildings.
- C6. Getting to know criteria and principles of intelligent installations design on the example of chosen building automation systems.
- C7. Acquiring and strengthening social competencies concerning the selfdependence, responsibility and reliability in the proceedings, awareness of effects of engineering actions taken.

**SUBJECT EDUCATIONAL EFFECTS***relating to knowledge:*

- PEK\_W01 He has a general knowledge of the planning principles of electrical installations in municipal buildings and knows the fundamental assumptions of the building automation and the system technology of intelligent installations.  
 PEK\_W02 He has a general knowledge of the construction and operation of selected intelligent installation systems, knows their basic advantages and disadvantages, is able to compare them objectively.  
 PEK\_W03 He has a detailed knowledge in the field of the construction and operation of selected intelligent installation systems.

*relating to skills:*

- PEK\_U01 He can design and select the elements of a traditional electrical installation in municipal buildings.  
 PEK\_U02 He can design and select the elements of an intelligent installation in chosen buildings automation systems.

*relating to social competences:*

- PEK\_K01 He is able to think and act in a creative and enterprising way.

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Introduction to the course and presentation of credit conditions. Preliminary information about the electrical installation, building automation, system technology of intelligent installation and intelligent building. Basic definitions and classifications	2
Lec 2	Determining of the power demand requirements. Planning the electrical installation in municipal buildings (electrical installation circuits, control functions).	2
Lec 3	Discussion of guidelines and criteria for the selection of the electrical installation components (cables, wires, protection devices, switchgears).	2
Lec 4	General presentation of the intelligent installation systems. Basic divisions and classifications.	2
Lec 5	General characteristics of the KNX system. Topology of the KNX system. The division and construction of the bus devices and system components. The physical addresses of the individual system elements.	2
Lec 6	The logical structure of the KNX system and group addresses. Logical connections between communication objects and the address groups. Designing a KNX installation.	2
Lec 7	Examples of applications and practical implementation of selected control functions in the KNX system.	2
Lec 8	General characteristics of the LCN system. The internal structure of the module, system components, system topology. Division and types of system devices.	2
Lec 9	The logical structure of the LCN system. Designing a LCN installation.	2
Lec 10	Examples of applications and practical implementation of selected control functions in the LCN system.	2
Lec 11	Comparative analysis of KNX and LCN systems.	2
Lec 12	Wireless solutions of intelligent installation systems.	2
Lec 13	Unconventional ways to implement building automation.	2
Lec 14	Implementation of advanced control functions in the selected installation systems. Summary. Development trends of building automation.	2
Lec 15	Discussion of the issues on the exam.	2
Total hours:		<b>30</b>

Form of classes - project		Number of hours:
Proj 1	Introduction to the course. Presentation of the course credit conditions. Distribution of project tasks and discussion of their scope. Planning the electrical installation and determining of the power demand requirements in the selected buildings.	2
Proj 2	Sizing and equipping the electrical installations in municipal buildings. Selection of cables, wires and protection devices in the distribution network and in chosen electrical installation circuits.	2
Proj 3	Guidelines concerning equipping the intelligent electrical installations. Devices selection, planning and designing of the various control functions on the example of chosen building automation systems.	2
Proj 4	Guidelines concerning equipping the intelligent electrical installations. Devices selection, planning and designing of the various control functions on the example of chosen building automation systems.	2
Proj 5	Guidelines concerning equipping the intelligent electrical installations. Devices selection, planning and designing of the various control functions on the example of chosen building automation systems.	2
Proj 6	Guidelines concerning equipping the intelligent electrical installations. Devices selection, planning and designing of the various control functions on the example of chosen building automation systems.	2
Proj 7	Guidelines concerning equipping the intelligent electrical installations. Devices selection, planning and designing of the various control functions on the example of chosen building automation systems.	2
Proj 8	The content and principles for the preparation of technical project documentation in the field of conventional and intelligent electrical installations.	1
Total hours:		<b>15</b>

TEACHING TOOLS USED
<p>N1. Information lecture with use of audio-visual techniques.</p> <p>N2. A multimedia presentation.</p> <p>N3. Discussion.</p> <p>N4. Software tools to design and programming the intelligent installations.</p> <p>N5. Personal consultations.</p>

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation <i>F – forming (during semester)</i> <i>P – concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(W)	PEK_W01 PEK_W02 PEK_W03	Exam
P(W)	P = F1	
F1(P)	PEK_U01 PEK_U02	Discussion
F2(P)	PEK_U01 PEK_U02	Evaluation of the project preparation
F3(P)	PEK_U01 PEK_U02 PEK_K01	Project defence
P(P)	P = 0,2F1 + 0,3F2 + 0,5F3	

PRIMARY AND SECONDARY LITERATURE
<b>PRIMARY LITERATURE:</b> [1] Markiewicz H., Instalacje elektryczne, WNT, current edition; [2] Selected standards and regulations of subject literature; <b>SECONDARY LITERATURE:</b> [1] Klajn A., Bielówka M., Instalacja elektryczna w systemie KNX/EIB, Informacje o Normach i Przepisach Elektrycznych – Miesięcznik Stowarzyszenia Elektryków Polskich, Podręcznik dla Elektryków – Zeszyt 10, Warszawa 2006; [2] Selected websites of the manufacturers of building automation systems, according to the Supervisor's recommendation;

SUBJECT SUPERVISOR
Małgorzata Bielówka, malgorzata.bielowka@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT ARR042316 - Intelligent buildings and structures installations AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY <b>Control Engineering and Robotics</b> AND SPECIALIZATION <b>Automation of Machines, Vehicles and Apparatus</b>				
Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subject objectives	Programme content	Teaching tool number
PEK_W01	S2AMPU_W12	C.1	Lec1 Lec2 Lec3 Lec15	N.1 N.3 N.5
PEK_W02	S2AMPU_W12	C.2	Lec4 Lec5 Lec6 Lec8 Lec9 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.3 N.5
PEK_W03	S2AMPU_W12	C.3 C.4	Lec7 Lec10 Lec11 Lec14 Lec15	N.1 N.3 N.4 N.5
PEK_U01	S2AMPU_U11	C.1 C.5	Proj1 Proj2 Proj8	N.2 N.3 N.5
PEK_U02	S2AMPU_U11	C.3 C.6	Proj3 Proj4 Proj5 Proj6 Proj7 Proj8	N.2 N.3 N.4 N.5
PEK_K01	K2AiR_K06	C.7	Proj1 Proj2 Proj3 Proj4 Proj5 Proj6 Proj7 Proj8	N.3 N.4 N.5