

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Rozproszone systemy automatyki**
 Name in English: **Distributed automation systems**
 Main field of study (if applicable): **Control Engineering and Robotics**
 Specialization (if applicable):
 Level and form of studies: **1st level, full-time**
 Kind of subject: **optional**
 Subject code: **ARR043215**
 Group of courses: **NO**

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

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has a basic knowledge of programmable controller.
2. Has a basic knowledge of industrial automation systems and communications networks.
3. 2. Can practically apply the knowledge of programmable controllers and their components.

SUBJECT OBJECTIVES

- C1. Familiarize students with a basic knowledge of the distributed automation systems.
 C2. Familiarize students with the types of industrial networks used in distributed automation systems.
 C3. Practical familiarize students with the devices used in distributed control systems.
 C4. The acquisition and consolidation of social competences including emotional intelligence involving the ability to work in a group of students with a view to effective problem solving. Responsibility, honesty and fairness in the procedure observance in force in academia and society.

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Has knowledge in the application of PLC in distributed automation systems.
 PEK_W02 Knows what are the characteristics of a distributed automation system.

relating to skills:

- PEK_U01 He can use the programmable controller in distributed automation systems.
 PEK_U02 He can formulate control algorithm in a distributed automation system and write program for the selected controller.

relating to social competences:

- PEK_K01 It has a sense of responsibility for own work and willingness to comply with the principles of teamwork and the responsibility for jointly implemented actions.

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Introductory classes. Basic definitions and notions.	2
Lec 2	Construction and programming of PLC and distributed modules.	2
Lec 3	Real-time systems. The components of a distributed automation system.	2
Lec 4	Communication in distributed automation systems. Examples of industrial communication networks.	2
Lec 5	SCADA and DCS in the distributed control systems.	2
Lec 6	Data exchange using DDE and OPC protocols.	2
Lec 7	EiB/KNX network as an example of a distributed automation system.	2
Lec 8	Final test	1
Total hours:		15

Form of classes - laboratory		Number of hours:
Lab 1	Introduction to the Rules and Regulations of internal safety lab. General familiarization with laboratory equipment.	2
Lab 2	Implementation of the selected control system using PLC.	2
Lab 3	Implementation of advanced control functions for the control system using PLC as the selected model of the industrial process	4
Lab 4	Introduction to the implementing the use of communication networks and the distributed modules.	2
Lab 5	Implementation of the selected industrial process using the distributed modules and the communication networks: DeviceNet and Profibus.	10
Lab 6	Programming of the visualization system using of operator panels.	4
Lab 7	Programming of the visualization system using SCADA software.	4
Lab 8	Summary and pass the lab.	2
Total hours:		30

TEACHING TOOLS USED
<p>N1. The lecture in the traditional manner.</p> <p>N2. Multimedia presentation.</p> <p>N3. Consultation.</p> <p>N4. Final test.</p> <p>N5. Traditionally carried out laboratory.</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	Final test.
P(W)	P=F1	
F1(L)	PEK_U01 PEK_U02	Activity in laboratory classes
F2(L)	PEK_U01 PEK_U02	Assesment of written programs.
P(L)	$P=0,3 \cdot F1 + 0,7 \cdot F2$	

PRIMARY AND SECONDARY LITERATURE
<p>PRIMARY LITERATURE:</p> <p>[1] Werewka J., Systemy rozproszone sterowania i akwizycji danych, CCATIE vol. 9, Kraków 1998</p> <p>[2] Grega W., Sterowanie cyfrowe w czasie rzeczywistym, Wyd. wyd. AAIiE AGH, Kraków 1999</p> <p>[3] Kasprzyk J., Programowanie sterowników przemysłowych, WNT, Warszawa 2006</p> <p>[4] Flaga S., Programowanie sterowników PLC w języku drabinkowym, Wyd. BTC, Legionowo, 2010</p> <p>SECONDARY LITERATURE:</p> <p>[1] Dokumentacje techniczne producentów sterowników PLC</p> <p>[2] Dokumentacje techniczne producentów systemów SCADA i DCS</p>

SUBJECT SUPERVISOR

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**MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ARR043215 - Distributed automation systems
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Control Engineering and Robotics**

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	K1AIR_AMPU_W07	C.1 C.2	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8	N.1 N.2 N.3 N.4
PEK_W02	K1AIR_AMPU_W07	C.1 C.2	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8	N.1 N.2 N.3 N.4
PEK_U01	K1AIR_AMPU_U07	C.3	Lab1 Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8	N.3 N.4 N.5
PEK_U02	K1AIR_AMPU_U07	C.3	Lab1 Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8	N.3 N.4 N.5
PEK_K01	K1AiR_K09	C.4	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lab1 Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8	N.1 N.2 N.3 N.4 N.5