FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Roboty w procesach przemysłowych**
Name in English:	**Robots in industrial processes**
Main field of study (if applicable):	**Industrial Control Engineering**
Specialization (if applicable):	**Automation of Machines, Vehicles and Apparatus**
Level and form of studies:	**2nd level, full-time**
Kind of subject:	**obligatory**
Subject code:	**APR013220**
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):	60		60		
Form of crediting:	crediting with grade		crediting with grade		
For group of courses mark (X) final course:					
Number of ECTS points:	2		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		1.40		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has a basic knowledge on the robots construction, programming and applications
2. Has a basic knowledge in the field of industrial process automation.
3. Has a basic on kinematics and dynamics of robots.
4. Is able to use the obtained knowledge on construction and operation of electrical drives of robots.
5. Is able to use the obtained knowledge on distributed control and industrial process automation using PLC.

SUBJECT OBJECTIVES

C1. Familiarizing students with the issues of construction and operation of modern drives applied in robots and machine tools.
C2. Familiarize students with the basics of designing robotic workstations.
C3. Gaining the skills of selection of industrial robots and manipulators for various industrial applications
C4. The acquisition of practical knowledge regarding the construction, operation, picking and robotic programming used in basic industrial processes.

SUBJECT LEARNING OUTCOMES

relating to knowledge:

PEU_W01	Has knowledge on basic robot control methods.
PEU_W02	Has matured knowledge on construction and applications of robots in industrial processes.
PEU_W03	Has knowledge on basic programming methods for industrial robots.

relating to skills:

PEU_U01	It has the basic skills related to designing robotic workstations.
PEU_U02	Can choose the robot type and its equipment, define its functional requirements depending on specific industrial process.

relating to social competences:

PEU_K01	Understands the needs for team work on finding and improving the methods of problem solving.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours:**
Lec 1	The development of industrial robotics. Factors stimulating the development of robotics.	2
Lec 2	Definitions and classification of industrial robots	2
Lec 3	Construction of industrial robots	2
Lec 4	Control of industrial robots	2
Lec 5	Programming of industrial robots.	2
Lec 6	Effectors and sensors of industrial robots.	2
Lec 7	Applications industrial robots	2
Lec 8	Final test	1
	Total hours:	**15**

Form of classes - laboratory		**Number of hours:**
Lab 1	Introduction to the construction and programming of industral and teaching robots *) student groups carry out exercises in the form of a problem laboratory	2
Lab 2	Application of robots in industrial processes part 1	2
Lab 3	Application of robots in industrial processes part 2	2
Lab 4	Application of robots in industrial processes part 3	2
Lab 5	Application of robots in industrial processes part 4	2
Lab 6	Application of robots in industrial processes (assembly, palletizing, packaging) part 5	2
Lab 7	Implementation of motion trajectories using selected mobile robots (Lego Mindstorms, Minisumo, Hexor) part 1	2
Lab 8	Implementation of motion trajectories using selected mobile robots (Lego Mindstorms, Minisumo, Hexor) part 2	2
Lab 9	Implementation of motion trajectories using selected mobile robots (Lego Mindstorms, Minisumo, Hexor) part 3	2
Lab 10	Implementation of motion trajectories using selected mobile robots (Lego Mindstorms, Minisumo, Hexor) part 4	2
Lab 11	Implementation of the selected technological process using Motion Control stations and CNC machine tools part 1	2
Lab 12	Implementation of the selected technological process using Motion Control stations and CNC machine tools part 2	2
Lab 13	Implementation of the selected technological process using Motion Control stations and CNC machine tools part 3	2
Lab 14	Implementation of the selected technological process using Motion Control stations and CNC machine tools part 4	2
Lab 15	Assesment of laboratory	2
	Total hours:	**30**

TEACHING TOOLS USED
N1. Lecture with multimedia tools combined with classical lecture (problem oriented)
N2. Consultation and final test
N3. Preparation to the laboratory exercises and testing of student knowledge
N4. Implementation reports of the exercises

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(W)	PEU_W01 PEU_W02 PEU_W03	Participation in lectures
F2(W)	PEU_W01 PEU_W02 PEU_W03	Final test
P(W)	P=0,1*F1+0,9*F2	
F1(L)	PEU_U01 PEU_U02 PEU_K01	Activity during laboratory exercises (includings grades obtaining during short tests).
F2(L)	PEU_U01 PEU_U02 PEU_K01	Preparation of the report
P(L)	P=0,3*F1+0,7*F2	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Honczarenko J., Roboty przemysłowe. Budowa i zastosowanie, WNT Warszawa 2010
[2] Zdanowicz R., Podstawy robotyki, Wydawnictwo Politechniki Śląskiej, Gliwice 2012
[3] Tomasz Buratowski, Podstawy robotyki, Uczelniane Wydawnictwo Naukowo-Dydaktyczne AGH, Kraków 2006

SECONDARY LITERATURE:

[1] Szkodny T., Podstawy robotyki, Wydawnictwo Politechniki Śląskiej, Gliwice 2012

SUBJECT SUPERVISOR

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