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COURSE DESCRIPTION CARD

Course name	Technologies of Industry 4.0				
Course type	optional	**Course code**	SDPB0011	**ECTS credits**	**2**
Forms and number of hours	lecture: 20 h	**Scientific discipline**	automation, electronic and electrical engineering; mechanical engineering		
Course objectives	The aim of the course is to familiarize PhD students with the technologies of the industry 4.0. Acquisition of skills and knowledge of the newest technologies of automation and robotics control in industry.				
Course content	Lecture: 1. Introduction to industrial IT systems, robotic systems and real-time industrial communication systems. 2. Big data and data processing. 3. Technologies of the smart factory. 4. Smart machines and devices structures in industry. 5. Industrial Internet of Things. 6. Cyberphysical systems and cybersecurity. 7. Systems based on augmented reality. 8. Tools supporting maintenance and preventive actions in the machine park. 9. Autonomous wheeled transport robots. 10. Flexible robots and assembly industrial robots cells. 11. Automation systems for enterprise management and supply chain management.				
Teaching methods	Lecture: informative-problem lecture, discussion; case study; students' own studies based on the indicated sources.				
Assessment method	Lecture: Written exam.				

Symbol of learning outcome	Learning outcomes	Reference to the learning outcomes for the field of study for the 8th level of Polish Qualification Framework (PRK)	Methods of assessing the learning outcomes
LO1	knowledge of the cyber-physical model of industrial automation	SD_W1, SD_W2	Exam
LO2	knowledge of the technologies that make up the "intelligent factory"	SD_W1, SD_W2	Exam
LO3	knowledge of the work principle autonomous robotics systems with a high degree of autonomy	SD_W1, SD_W2	Exam
LO4	practical skills of using the IT tools and selected digitization technologies in industrial applications	SD_U1, SD_U2	Exam

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Student workload (in hours)	
Lecture	20
Consultations	2
The unassisted student work	20
Implementation of project tasks and preparation for and participation in exams/tests	10
Total	**52**
ECTS credits	**2**

Basic references	1. Didactic resources of the teacher. 1. Technical guides of Siemens, Astor, Fanuc, Festo. 2. Rajkumar R.,, Niż D., Klein M., Cyber-Physical Systems, Addison-Wesley Professional, 1 ed., 2017. 3. Anderson G.D., Industrial Network Basics: Practical Guides for the Industrial Technician, CreateSpace Independent Publishing Platform, 2014. 4. Tatjewski P., Sterowanie zaawansowane obiektów przemysłowych, struktury i algorytmy, Exit, 2002.
Supplementary references	Webpages: 1. https://automatykab2b.pl/ 2. https://iautomatyka.pl/ 3. https://strefainzyniera.pl/ 4. https://www.multiprojekt.pl/ 5. https://www.profibus.com/ Libraries: 6. https://www.biblioteka.siemens.academy/materials 7. https://support.industry.siemens.com/cs/products?mfn=ps&lc=en-PT
Author of the programme	Arkadiusz Mystkowski, PhD (Eng), DSc, Assoc. Prof. (AEEE)
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