



## Subject card

Subject name and code	Monitoring and Measuring-and-Diagnostic Systems, PG_00038118						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2021/2022		
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Metrology and Information Systems -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Tomasz Ciszewski				
	Teachers		dr inż. Tomasz Ciszewski				
			dr hab. inż. Dariusz Świsulski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie:						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	45		4.0		26.0	75
Subject objectives	Acquiring fundamental knowledge on the theory of diagnostic measurements as well as methods and diagnostic measurement systems used in automatics.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U04						
	K6_W03						
	K6_K02		Student is able to cooperate with others in a group, analyze the issues and seek for solutions to introduced problems with other group members. He also has the ability to present the obtained results and to conduct constructive discussion leading to conclusions.		[SK4] Assessment of communication skills, including language correctness		
Subject contents	LECTURE General problems of diagnostics. Diagnostic economy. Vibroacoustic diagnostics. Ultrasonic diagnostics. Thermovision diagnostics. Diagnostics of electrical machines. Diagnostics of electronic modules. Building monitoring. Access control systems, levels of protection. Alarming systems. FTC systems. Sparkproof systems. The structure of diagnostic systems (management of tests, test modules, the measurement procedures). Measuring equipment (DAQ card, PXI standard, measuring instruments with standard interfaces). Measurement software (methods of programming, LabVIEW environment, SCPI language). The use of wireless transmission for remote monitoring (radiomodems, GSM). Examples of measurement and diagnostic systems (diagnostics of control valves and traction motors). LABORATORY EXERCISES Using LabVIEW software for prepare measurement procedures. Cooperation of computers with the measuring equipment. Thermovision diagnostics. Detection of electrical machine faults by vibration and current (MCSA) methods.						
Prerequisites and co-requisites	Basic electric engineering knowledge. Ability to connect electrical and electronic circuits.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Practical exercise		60.0%		40.0%		
	Midterm colloquium		60.0%		60.0%		

Recommended reading	Basic literature	1. Lesiak P., Świsulski D.: Komputerowa technika pomiarowa w przykładach. Agenda Wydawnicza SIMP, Warszawa 2002. 2. Cempel C., Tomaszewski F.: Diagnostyka maszyn. Zasady ogólne. Przykłady zastosowań., ITE, Radom 1992. 3. Praca zbiorowa (red. Madura H.). Pomiary termowizyjne w praktyce. Agenda Wydawnicza PAK, Warszawa 2004.
	Supplementary literature	1. Mikulik, Jerzy: Podstawowe systemy bezpieczeństwa w budynkach inteligentnych, Wydawnictwo Politechniki Śląskiej, Gliwice 2005. 2. Nawrocki W.: Komputerowe Systemy Pomiarowe, WKŁ, Warszawa 2002 3. Świsulski D.: Komputerowa technika pomiarowa. Oprogramowanie wirtualnych przyrządów pomiarowych w LabVIEW. Agenda Wydawnicza PAK, Warszawa 2005
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Draw and discuss the structure of the test system.  2. Structure and working principle of sample-remember system.  3. Discuss the purpose of the bus transmission control IEC-625.  4. How do you determine the optimal scope of diagnosis in the enterprise.  5. The principle of operation of ultrasonic flaw detector analog.  6. Please rank the methods of mounting the accelerometers according to increasing frequency range.  7. To present and compare the basic configurations of the track analog measurement signals acquisition card .  8. What is resolution and ADC range-digital.  9. Bath curve-discuss the characteristic points  10. Discuss the construction and properties of the accelerometer of type ICP.	
Work placement	Not applicable	