

GDAŃSK UNIVERSITY

Subject card

Subject name and code	Process Diagnostics, PG_00047517								
Field of study	Automatic Control, Cybernetics and Robotics								
Date of commencement of studies	February 2023		Academic year of realisation of subject			2022/2023			
Education level	second-cycle studies		Subject group			Optional subject group Subject group related to scientific research in the field of study			
Mode of study	Full-time studies		Mode of delivery			at the university			
Year of study	1		Language of instruction			English			
Semester of study	1		ECTS credits			2.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Department of Decision Systems and Robotics -> Faculty of Electronics, Telecommunications and Informatics						and		
Name and surname	Subject supervisor		prof. dr hab. inż. Zdzisław Kowalczuk						
of lecturer (lecturers)	Teachers		prof. dr hab. i	nż. Zdzisław K	zisław Kowalczuk				
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	15.0	0.0	0.0	0.0		15.0	30	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	earning activity Participation ir classes include plan		Jidactic Participation in J in study consultation hours		Self-st	udy	SUM	
	Number of study 30 hours		4.0		16.0 50				
Subject objectives	Familiarization with modern methods of diagnostics of industrial processes								
Learning outcomes	Course out	Course outcome Subject outcome				Method of verification			
	[K7_W03] Knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum.		The student understands the structure and principles of operation of components and systems, including theories, methods and relationships between them, as well as other selected specific issues			[SW1] Assessment of factual knowledge			
	[K7_W21] Knows and understands, to an advanced extent, methods and techniques of design and operation of automatic control systems, control and robotics systems, as well as the use of computers in the control and monitoring of dynamic objects		understands and knows the algorithmic methods of process diagnostics			[SW1] Assessment of factual knowledge			
Subject contents Prerequisites	Fault detection methods: the control of process parameters, examination of limitations (credibility, alarm limits, trends), analysis of signals; control compounds (redundancy, feedback, deterministic and statistical compounds) modeling methods, quality models, fuzzy and neural; Methods and tools for fault location: elements of description of the object and diagnosing system (state of an object, process variables, diagnostic signals, relationship fault-symptoms, binary matrices, arrays of states, isolability, diagnosis), redundancy in hardware, logic, observers (diagnostic systems/banks, observation with unknown inputs, systems robustness), equations and spaces parity (residua, directivity, parity/balance equations), pattern recognition (classical methods of classification, neural classifiers), binary diagnostic matrix (expert knowledge, reasoning, serial, diagnostic trees, contradiction symptoms, parallel reasoning) , Bayesian theory (conditional probability, probabilistic inference) Information System (relationship-damaging symptoms, assessment of multivalent, distinctness, reasoning parallel and serial, reduced systems), fuzzy logic (evaluation of residues, fuzzy inference, fuzzy relationship Diagnostic, fuzzy neural networks).								
and co-requisites									

Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	Application report methods	50.0%	100.0%			
Recommended reading	Basic literature	J.M. Kościelny: <i>Diagnostyka Zautomatyzowanych Procesów</i> <i>Przemysłowych</i> , Akademicka Oficyna Wydawnicza EXIT, Warszawa 2001 J. Korbicz, J.M. Kościelny, Z. Kowalczuk, W. Cholewa: <i>Fault Diagnosis</i> <i>Models, Artificial Intelligence, Applications, Springer</i> , Berlin 2004				
	Supplementary literature	B.D.O. Andersson, J.B. Moore: <i>Optimal Filtering,</i> Prentice-Hall, Englewood Cliffs 1979				
	eResources addresses	Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed	Research within the scope of fault detection methods: the control of process parameters, examination of limitations (credibility, alarm limits, trends), analysis of signals; control compounds (redundancy, feedback, deterministic and statistical compounds) modeling methods, quality models, fuzzy and neural; Methods and tools for fault location: elements of description of the object and diagnosing system (state of an object, process variables, diagnostic signals, relationship fault-symptoms, binary matrices, arrays of states, isolability, diagnosis), redundancy in hardware, logic, observers (diagnostic systems/banks, observation with unknown inputs, systems robustness), equations and spaces parity (residua, directivity, parity/balance equations), pattern recognition (classical methods of classification, neural classifiers), binary diagnostic matrix (expert knowledge, reasoning, serial, diagnostic trees, contradiction symptoms, parallel reasoning), Bayesian theory (conditional probability, probabilistic inference) Information System (relationship-damaging symptoms, assessment of multivalent, distinctness, reasoning parallel and serial, reduced systems), fuzzy logic (evaluation of residues, fuzzy inference, fuzzy relationship Diagnostic, fuzzy neural networks).					
Work placement	Not applicable					