Subject card

Subject name and code	Processes fault diagnosis, PG_00042363
Field of study	Automation, Robotics and Control Systems

Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
Education level	second-cycle studies	Subject group	
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Department of Control Systems Engineering -> Faculty of Electrical and Control Engineering

Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Michał Grochowski
	Teachers	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	10.0	0.0	0.0	20
	E-learning hours included: 0.0						

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	20	15.0	90.0	125

Subject objectives	To gain basic knowledge of monitoring and diagnostic methods in control engineering systems based on data. Use of multidimensional statistical analysis methods for the design of diagnostic models. Acquiring skills of proper use of the methods learned in order to design and implement the basic diagnostic systems.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K7_W06	Student is able to design decision support systems.	[SW3] Assessment of knowledge contained in written work and projects
	K7_U07	Student designs and implements simple diagnostic systems. He uses selected methods of computational intelligence in the projects. He uses the software tool: Matlab/Simulink at an advanced level. On the basis of the conducted research, he knows how to draw conclusions.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
	K7_W11	Student can use advanced methods and computer tools to synthesize the diagnostic systems.	[SW3] Assessment of knowledge contained in written work and projects
	K7_U04	The student is able to use current literature sources in order to supplement and to develop his or her knowledge.	[SU2] Assessment of ability to analyse information

Subject contents	Data acquisition systems in control engineering systems. Processing of measurement information. Preprocessing of measuring data. Statistical Process Control (SPC). Technologies for monitoring the plant/process. Utilization of models based on process data for the diagnosis. Multidimensional statistical analysis. Diagnosis of actuators and measuring devices. Early detection of system failures/failure.
Prerequisites and co-requisites	Knowledge of the following subjects: Mathematics (0411200001, 0411200002), Numerical Methods (0411200009), optimization and decision making (0411200030) Methods of artificial intelligence (xxxxxxxxxx), the Methods and basis of identification (0411210003) and Modeling and identification (04 12 20 0001)

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	50.0%	50.0%
	Written exam	50.0%	50.0%

Recommended reading	Basic literature	1. Korbicz, J., Kościelny, J, Kowalczuk, Z., Cholewa, W. Diagnostyka procesów. Modele, metody sztucznej inteligencji, zastosowania. Wydawnictwa Naukowo Techniczne, Warszawa 2002. 2. Byrski, W. Obserwacja i sterowanie w systemach dynamicznych. Uczelniane Wydawnictwa Naukowo–Dydaktyczne Akademii Górniczo–Hutniczej w Krakowie, 2007. 3. Korbicz, J., Kościelny. Modelowanie, diagnostyka i sterowanie nadrzędne procesami. Implementacja w systemie DiaSter. Wydawnictwa Naukowo Techniczne, Warszawa 2009. 4. Osowski, S. Sieci neuronowe do przetwarzania informacji, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2000.
	Supplementary literature	1. Jackson, J.E., A User"s Guide to Principal Components, Wiley-Interscience (New York), 1991. 2. Walnut D.F. An introduction to wavelet analysis. Birkhauser, Boston 2002. 3. Berthold, M. Hand, D. J. Intelligent data analysis, an intruduction. Springer, 1999.
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable