GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Knowledge Engineering Systems, PG_00038296		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Katedra Inteligentnych Systemów Sterowania i Wspomagania Decyzji -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Tomasz Rutkowski	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	10.0	0.0	20.0	0.0	0.0	30
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	30	3.0	42.0	75

Subject objectives

Acquiring basic knowledge related to the knowledge engineering domain. Getting to know the selected knowledge engineering systems and methods. Acquiring the ability to properly use the known issues in the design and implementation of the expert system for the purposes of solving simple engineering and research problems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_U07	The student is able to explain basic concepts related to knowledge engineering systems. The student is able to combine knowledge from different fields. Describes the implementation of rules using classical logic and fuzzy logic. Explains the logic programming paradigm and the logic programming paradigm with constraints. Designs and implements simple expert systems based on the rule-model expert system - RMSE.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
K7_W05	The student is able to use selected methods of inference and artificial intelligence methods in projects. The student is able to use software tools such as: Matlab/ Simulink, RMSE, ECLiPSe Constraint Programming System.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

Subject contents	LECTURE: Definitions and basic concepts in the field of knowledge engineering systems. Expert systems. Selected methods of knowledge acquisition and knowledge representation. Heuristics. Representation of problems and search space. Selected graph search techniques. Constraint logic programming paradigm. Examples of artificial intelligence methods in expert systems. Practical examples of functional applications implementation in Matlab/Simulink, RMES and ECLiPSe Constraint Programming System environments. TRAINING LABORATORY: Realization of the rules based on classical logic and fuzzy logic, creating simple graphical user interfaces in the Matlab/Simulink environment. Solving selected test problems with artificial intelligence methods. Solving selected test problems with an elementary and exact knowledge base for the RMES expert system shell. Basics of constraint logic programming solving selected test problems with ECLiPSe Constraint Programming System environment.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory exercise reports	50.0%	50.0%
Lecture test	50.0%	50.0%

Recommended reading

Basic literature	1. Hand D., Mannila H., Smyth P. (2005), Eksploracja danych. WNT, Warszawa. 2. Korbicz, J., Kościelny, J, Kowalczuk, Z., Cholewa, W. (2002), Diagnostyka procesów. Modele, metody sztucznej inteligencji, zastosowania. Wydawnictwa Naukowo Techniczne, Warszawa. 3. Koronacki J., Ćwik J. (2005), Statystyczne systemy uczące się. WNT, Warszawa. 4. Marriott K., Stuckey P.J. (1999), Programing with constraints. The MIT Press, London. 5. Mulawka J. (1996), Systemy ekspertowe. Wydawnictwa Naukowo Techniczne, Warszawa.
Supplementary literature	1. Osowski, S. (2000), Sieci neuronowe do przetwarzania informacji, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa. 2. Piegat, A. (1999), Modelowanie i sterowanie rozmyte, Akademicka Oficyna Wydawnicza EXIT, Warszawa.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	• Present and describe selected methods of knowledge representation • Present and describe basic inference algorithms • Present and briefly describe the structure of a typical expert system • Briefly describe constraint logic programing paradigm
Work placement	Not applicable