COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Electrical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Automatic Control and Robotics</td><td>Degree level and programme type</td><td>bachelor’s degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6">-</td><td>Study profile</td><td>-</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Intelligent Technical Systems</td><td>Course code</td><td>IS-FEE-10064W</td></tr>
<tr><td>Course type</td><td>elective</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>winter</td></tr>
<tr><td>30</td><td></td><td></td><td>30</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9"></td></tr>
<tr><td>Course objectives</td><td colspan="9">This course deals with the study of artificial intelligence used in modern technical systems. The students will be introduced into the basics of machine learning including the practical application of neural networks and genetic algorithms.</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: Principles and main features of the Industry 4.0, basic concepts of the artificial intelligence, basic theory of the neural networks and their appliance in control applications, categorization, description, importance and development of the intelligent materials used in the modern technical applications, theory and sample practical applications of genetic algorithms, utilization of the fuzzy systems in different control applications.
Project: Simulation study of neural network utilization for plant control, design, programming and evolution of the genetic algorithm for movement realization of the bioinspired mechanical system, design and implementation of the adaptive fuzzy control for object with time-variant characteristics.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">lecture, project</td></tr>
<tr><td>Assessment method</td><td colspan="9">lecture – test, project – project realization and presentation</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="7">Learning outcomes</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="7">knows and understands the concept of the industry 4.0</td><td colspan="2"></td></tr>
<tr><td>LO2</td><td colspan="7">knows and understands the concept of the artificial intelligence</td><td colspan="2"></td></tr>
<tr><td>LO3</td><td colspan="7">can explain how the neural networks work</td><td colspan="2"></td></tr>
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LO4	is able to name and categorize intelligent materials	
LO5	knows basic concepts of the genetic algorithms	
LO6	understands workflow of the fuzzy systems	
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	lecture: written test	
LO2	lecture: written test	
LO3	lecture: written test; project: evaluation of the project completion, discussion and activity during the classes	
LO4	lecture: written test	
LO5	lecture: written test; project: evaluation of the project completion, discussion and activity during the classes	
LO6	lecture: written test; project: evaluation of the project completion, discussion and activity during the classes	
Student workload (in hours)		**No. of hours**
Calculation	lecture attendance	30
	project attendance	30
	preparation for the lecture written test	15
	preparation for the project classes	10
	working on projects	25
	preparation for projects completion	20
	TOTAL:	130

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	60	2
Student workload – practical activities	100	4

Basic references	1. Conway D, White M. J.: Machine Learning for Hackers. O'REILLY, 2012. 2. Russell S., Norvig P.: Artificial Intelligence: A Modern Approach (Pearson Series in Artifical Intelligence), Pearson, 2022 3. Tewari A.: Modern control design: with MATLAB and Simulink. Wiley-IEEE Press, 2001.
Supplementary references	1. Russell S. J., Norvig P., Artificial intelligence - a modern approach (2nd Ed.), Prentice-Hall, 2001. 2. Bequette B. W.: Process control, modeling, design and simulation. Prentice Hall, 2003.

Organisational unit conducting the course	Department of Automatic Control and Robotics	**Date of issuing the programme**
Author of the programme	Sławomir Romaniuk, PhD	2022-02-20

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar