

COURSE DESCRIPTION CARD – SPECIMEN

| Faculty of Electrical Engineering | | | | | | | | | |
|--------------------------------------|---|---|----|----|----|----|---|---|-------------------|
| Field of study | Automatic Control and Robotics | | | | | | | Degree level and programme type | bachelor's degree |
| Specialization/ diploma path | - | | | | | | | Study profile | - |
| Course name | Intelligent Technical Systems | | | | | | | Course code | IS-FEE-10064W |
| | | | | | | | | Course type | elective |
| Forms and number of hours of tuition | L | C | LC | P | SW | FW | S | Semester | winter |
| | 30 | | | 30 | | | | No. of ECTS credits | 5 |
| Entry requirements | | | | | | | | | |
| Course objectives | 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. | | | | | | | | |
| Course content | <p>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.</p> <p>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.</p> | | | | | | | | |
| Teaching methods | lecture, project | | | | | | | | |
| Assessment method | lecture – test, project – project realization and presentation | | | | | | | | |
| Symbol of learning outcome | Learning outcomes | | | | | | | Reference to the learning outcomes for the field of study | |
| LO1 | knows and understands the concept of the industry 4.0 | | | | | | | | |
| LO2 | knows and understands the concept of the artificial intelligence | | | | | | | | |
| LO3 | can explain how the neural networks work | | | | | | | | |

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| L04 | is able to name and categorize intelligent materials | |
| L05 | knows basic concepts of the genetic algorithms | |
| L06 | 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 |
| L01 | lecture: written test | |
| L02 | lecture: written test | |
| L03 | lecture: written test; project: evaluation of the project completion, discussion and activity during the classes | |
| L04 | lecture: written test | |
| L05 | lecture: written test; project: evaluation of the project completion, discussion and activity during the classes | |
| L06 | 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 |
| Student workload – activities that require direct teacher participation | | 60 |
| Student workload – practical activities | | 100 |
| Basic references | <ol style="list-style-type: none"> Conway D, White M. J.: Machine Learning for Hackers. O'REILLY, 2012. Russell S., Norvig P.: Artificial Intelligence: A Modern Approach (Pearson Series in Artificial Intelligence), Pearson, 2022 Tewari A.: Modern control design: with MATLAB and Simulink. Wiley-IEEE Press, 2001. | |
| Supplementary references | <ol style="list-style-type: none"> Russell S. J., Norvig P., Artificial intelligence - a modern approach (2nd Ed.), Prentice-Hall, 2001. 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