COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Bialystok University of Technology
Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Medical Engineering</td><td>Level and form of studies</td><td>Full-time studies master’s degree</td></tr>
<tr><td>Specialization / Diploma Path</td><td colspan="6">Common subject</td><td>Educational profile</td><td>General academic</td></tr>
<tr><td rowspan="2">Course Name</td><td colspan="6" rowspan="2">Artificial Intelligent (E)</td><td>Item Code</td><td>MYIB2S0101</td></tr>
<tr><td>Type of classes</td><td>mandatory</td></tr>
<tr><td rowspan="2">Forms of classes and number of hours</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>1</td></tr>
<tr><td>30</td><td></td><td></td><td></td><td>30</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">Transfer of knowledge in the field of artificial intelligence and the ability to apply select methods of artificial intelligence to solve problems in the field of biomedical engineering.</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: Artificial Intelligence (AI) – introduction. Turing test. Features of biomedical data. Classification. Methods for assessing the quality of classifiers. Minimum distance classification. Design of the kNN classifier. Cluster analysis. Naive Bayesian classifier. Decision trees. Artificial neural networks (ANNs). Expert systems. Knowledge engineers. Inference methods in rule-based systems . Symbolic methods of knowledge representation. Representation of uncertain and incomplete knowledge. Fuzzy logic application examples. Ethical aspects of the use of artificial intelligence in biomedical engineering.

Specialization workshops: Turing test of chat bots. Creating intelligent systems in applications related to biomedical engineering.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Informational lecture and case studies; solving practical problems in groups;</td></tr>
<tr><td>Assessment methods</td><td colspan="9">Lecture – written exam; Specialization workshop – completion and defense of tasks performed</td></tr>
<tr><td>Symbol of</td><td colspan="7">Expected learning outcomes</td><td colspan="2">Reference to the</td></tr>
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learning outcome:		learning outcomes defined for the field of study
	Knowledge: The graduate knows and understands	
EU1	The main methods used in artificial intelligence	IB2_W04
EU2	Unidirectional neural networks and issues related to neural network learning	IB2_W04
EU3	the structure of expert systems and the methods of inference in these systems	IB2_W04
	Skills: the graduate is able to	
EU4	critically analyse existing technical solutions of biomedical devices and propose their improvement using artificial intelligence methods	IB2_U04, IB2_U11
	Social competence: the graduate is ready to	
EU5	apply ethical aspects of artificial intelligence in biomedical applications	IB2_K07
Symbol of learning outcome:	**Methods of assessment of learning outcomes**	**Form of classes where verification takes place**
EU1	Lecture: written exam	**L**
EU2	Lecture: written exam	**L**
EU3	Lecture: written exam	**L**
EU4	Specialization workshop: evaluation of performed tasks,	**SW**
EU5	Lecture: written exam; Specialization workshop: evaluation of performed tasks.	**L, SW**
Student workload (in hours)		**No. of hours**
Calculation	Participation in lectures	**30**
	Participation in a specialization workshop	**30**
	Exam Preparation	**30**
	Attendance of exam	**2**
	Preparation for classes as part of specialization	**10**

	workshops	
	Independent implementation of tasks from the specialization workshop	**18**
	Participation in consultations	**5**
	TOTAL:	**125**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload requiring direct teacher participation	**67**	**2.7**
Student's workload related to practical activities	**63**	**2.5**

Basic literature	1. Flasiński M., Wstęp do sztucznej inteligencji.: Wydaw. Naukowe PWN, Warszawa, 2018. 2. Rutkowski L., Metody i techniki sztucznej inteligencji. Wydaw. Naukowe PWN, Warszawa, 2009. 3. Osowski S., Sieci neuronowe do przetwarzania informacji. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2013. 4. Wawrzyński P.: Podstawy sztucznej inteligencji. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2020.
Supplementary Literature	1. Białko M., Sztuczna inteligencja i elementy hybrydowych systemów ekspertowych. Wydaw. Uczelniane Politechniki Koszalińskiej, Koszalin, 2005. 2. Wilamowski B. M., Irwin J. D., Intelligent systems. CRC/Taylor & Francis, 2011. 3. Kai-Fu L. : Inteligencja sztuczna, rewolucja prawdziwa. Chiny, USA i przyszłość świata. Wyd. Media Rodzina, 2019

Organizational unit conducting the course	Institute of Biomedical Engineering	**Date of issuing the programme**
Program developed by	Marcin Derlatka, PhD	04.07.2022

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