



Subject card

Subject name and code	Artificial Intelligence in Wireless Communications, PG_00069757						
Field of study	Sztuczna inteligencja w komunikacji bezprzewodowej						
Date of commencement of studies	February 2025		Academic year of realisation of subject		2025/2026		
Education level	second-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Radiocommunication Systems and Networks -> Faculty of Electronics Telecommunications and Informatics -> Wydział Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Krzysztof Cwalina				
	Teachers		dr inż. Krzysztof Cwalina mgr inż. Alicja Olejniczak				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	0.0	30
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 1517 Sztuczna inteligencja w komunikacji bezprzewodowej https://enauczanie.pg.edu.pl/2025/course/view.php?id=1517						
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		0.0		0.0	30
Subject objectives	The course aims to familiarize students with the applications of artificial intelligence, machine learning, and neural networks in radiocommunication systems and networks. Students will learn about modern methods and applications, along with current trends in the development of artificial intelligence in wireless communications. The differences between the application of artificial intelligence methods in wireless communications and well-known and popular areas of application in other fields will also be discussed, along with the issues of model robustness and sensitivity.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum		Knows and understands methods of training neural networks and their application in radio communication systems and networks.		[SW1] Ocena wiedzy faktograficznej		
	[K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it		Designs, implements and optimizes machine learning methods, in particular neural network learning, for use in radio communication systems and networks depending on requirements.		[SU1] Ocena realizacji zadania [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU4] Ocena umiejętności korzystania z metod i narzędzi		

Subject contents	Course content – lecture Introduction to wireless communication Introduction to artificial intelligence, machine learning and neural networks Modern AI methods and applications in the physical layer of the radio interface Modern AI methods and applications in the data link layer of the radio interface Differences and issues of usage known AI methods in wireless communication Models sensitivity Models resistance		
	Course content – project Modern Artificial Intelligence Methods and Applications in Radio Interface Layers Model Robustness and Sensitivity		
Prerequisites and co-requisites	Knowledge of the basics of artificial intelligence algorithms, machine learning and neural networks as well as basic issues related to wireless communication and radio link implementation.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		50.0%	50.0%
		50.0%	50.0%
Recommended reading	Basic literature	Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville MIT Press Ltd, 2016 Unlocking Artificial Intelligence, Christopher Mutschler, Christian Münzenmayer, Norman Uhlmann, Alexander Martin, Springer 2024 Chen, Wei, Ruisi He, Gongpu Wang, et al. AI Assisted PHY in Future Wireless Systems: Recent Developments and Challenges, China Communications 18, 2021 Letaief, K. B., Chen, W., Shi, Y., Zhang, J., & Zhang, Y. J. A., The roadmap to 6G: AI empowered wireless networks. IEEE communications magazine, 57(8), 2019 Wang, Jun, Rong Li, Jian Wang, Yi-qun Ge, Qi-fan Zhang, and Wu-xian Shi, Artificial Intelligence and Wireless Communications, Frontiers of Information Technology & Electronic Engineering 21 (10), 2020 Van Huynh, Nguyen, Jiacheng Wang, Hongyang Du, et al., Generative AI for Physical Layer Communications: A Survey, IEEE Transactions on Cognitive Communications and Networking 10 (3), 2024	
	Supplementary literature	Advanced Wireless Communication and Artificial Intelligence Breakthroughs in Electronics and Communication Engineering, Satti Sudha Mohan Reddy, Parul Awasthi, Vishal Awasthi, Ch Santhi Rani, IIP Iterative International Publishers, 2025 Principles of Data Science, Sinan Ozdemir, 2016 Packt Publishing	
	eResources addresses		

Example issues/ example questions/ tasks being completed	
Practical activities within the subject	Not applicable

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