

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Generative AI, PG_00064442							
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering							
Date of commencement of studies	February 2025		Academic year of realisation of subject			2025/2026		
Education level	second-cycle studies		Subject group			Optional subject group		
						Specialty subject group		
						Subject group related to scientific research in the field of study		
Mode of study	Full-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		assessment			
Conducting unit	Department of Biome	dical Engineeri	ng -> Faculty c	of Electronics, 7	Felecom	munica	tions and Info	rmatics
Conducting unit Name and surname	Department of Biome Subject supervisor	dical Engineeri	ng -> Faculty c dr hab. inż. M	of Electronics, ∃ ariusz Kaczma	Felecom rek	munica	tions and Info	rmatics
Conducting unit Name and surname of lecturer (lecturers)	Department of Biome Subject supervisor Teachers	dical Engineeri	ng -> Faculty c dr hab. inż. M	of Electronics, ٦ ariusz Kaczma	Γelecom rek	imunica	tions and Info	rmatics
Conducting unit Name and surname of lecturer (lecturers) Lesson types and methods	Department of Biome Subject supervisor Teachers Lesson type	dical Engineeri	ng -> Faculty c dr hab. inż. M Tutorial	of Electronics, ٦ ariusz Kaczma Laboratory	Felecom rek Project	munica t	tions and Info	rmatics SUM
Conducting unit Name and surname of lecturer (lecturers) Lesson types and methods of instruction	Department of Biome Subject supervisor Teachers Lesson type Number of study hours	dical Engineeri Lecture 15.0	ng -> Faculty c dr hab. inż. M Tutorial 0.0	of Electronics, 1 ariusz Kaczma Laboratory 15.0	rek Projec 15.0	munica	tions and Info Seminar 0.0	SUM 45
Conducting unit Name and surname of lecturer (lecturers) Lesson types and methods of instruction	Department of Biome Subject supervisor Teachers Lesson type Number of study hours E-learning hours inclu	dical Engineeri Lecture 15.0 Ided: 0.0	ng -> Faculty c dr hab. inż. M Tutorial 0.0	f Electronics, 1 ariusz Kaczma Laboratory 15.0	Felecom rek Project 15.0	t	tions and Info Seminar 0.0	SUM 45
Conducting unit Name and surname of lecturer (lecturers) Lesson types and methods of instruction Learning activity and number of study hours	Department of Biome Subject supervisor Teachers Lesson type Number of study hours E-learning hours inclu Learning activity	dical Engineeri Lecture 15.0 Ided: 0.0 Participation in classes includ plan	ng -> Faculty c dr hab. inż. M Tutorial 0.0 n didactic ed in study	f Electronics, 1 ariusz Kaczma Laboratory 15.0 Participation i consultation h	Felecom rek Project 15.0 n ours	t Self-st	Seminar 0.0 udy	SUM 45 SUM
Conducting unit Name and surname of lecturer (lecturers) Lesson types and methods of instruction Learning activity and number of study hours	Department of Biome Subject supervisor Teachers Lesson type Number of study hours E-learning hours inclu Learning activity Number of study hours	dical Engineeri Lecture 15.0 Ided: 0.0 Participation in classes includ plan 45	ng -> Faculty c dr hab. inż. M Tutorial 0.0 n didactic ed in study	f Electronics, 1 ariusz Kaczma Laboratory 15.0 Participation i consultation h 2.0	relecom rek Projec 15.0	Self-st	Seminar 0.0 udy	SUM 45 SUM SUM 75

Learning outcomes	Course outcome	Subject outcome	Method of verification				
	[K7_W08] knows and understands, to an increased extent, the fundamental dilemmas of modern civilisation, the main development trends of scientific disciplines relevant to the field of education	The student knows and understands issues related to the development of artificial intelligence, in particular generative techniques such as language models and image generation. Can indicate the main directions of development in this field.	[SW2] Assessment of knowledge contained in presentation				
	[K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems	The student understands the importance of knowledge about AI in solving cognitive and practical problems, such as the ethics of artificial intelligence, automation of creative processes and social and technological implications resulting from the wide implementation of generative technologies.	[SK5] Assessment of ability to solve problems that arise in practice				
	[K7_W01] knows and understands, to an increased extent, mathematics to the extent necessary to formulate and solve complex issues related to the field of study	The student knows and understands the elements of mathematics, including differential calculus, linear algebra and probability theory. He can apply these mathematical tools to analyze generative models and to interpret their operation in the context of creating new data and optimizing results.	[SW1] Assessment of factual knowledge				
	[K7_U12] is able, to an increased extent, to analyze the operation of components and systems related to the field of study, as well as to measure their parameters and study their technical characteristics, and to plan and carry out experiments related to the field of study, including computer simulations, interpret the obtained results and draw conclusions	The student is able to analyze the operation of generative algorithms, measure their parameters, examine the efficiency of models, conduct computer simulations and interpret the obtained results.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools				
Subject contents	 Introduction NLP basics Transformers LLM Basic Gen AI architectures for image (Diffusion Models, GANs, VAEs) Generating images from Text-to-Image Descriptions Other GenAI Models (Sound, Music, Video) Advanced Generative model techniques Advanced "Foundation Model" techniques Reinforcement Learning Training on Big Data Model evaluation and assessment metrics Practical applications of GenAI Models Controlled Data Generation Securing Generative Models 						
Prerequisites and co-requisites	 Prerequisites: in the field of theoretical knowledge - knowledge of image and natural language processing and analysis algorithms and the basics of neural networks, in the field of practical knowledge - basics of the Python language 						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	laboratory	50.0%	30.0%				
	project	50.0%	30.0%				
	lectures	50.0%	40.0%				
Recommended reading	Basic literature	"Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play" David Foster "Deep Generative Modeling" Jakub M. Tomczak					
	Supplementary literature n/a						
	eResources addresses	Adresy na platformie eNauczanie:					

Example issues/ example questions/ tasks being completed	nie dotyczy
Work placement	Not applicable

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