

Subject card

Subject name and code	Artificial Intelligence in Mathematics Education, PG_00209696						
Field of study	Mathematics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study Optional 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	1		ECTS credits		5.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Division of Didactics of Mathematics -> Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Elżbieta Mrożek				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
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	60		2.0		63.0	125
Subject objectives	The aim of the course is to prepare students to use artificial intelligence tools in mathematics education in a conscious, critical, and responsible way, with a focus on supporting mathematical reasoning, designing learning activities, and creating or adapting mathematical tasks.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MATMU2_U05] is able to apply new or adapt existing methods and tools from a selected field of mathematics and information and communication technologies in related fields		The student is able, with the support of artificial intelligence tools, to apply methods and examples from a chosen area of mathematics to related fields, recognising both their usefulness and their limitations.		[SU8] observation of student's independent or team work		
	[MATMU2_W01] knows and understands in depth the theory of selected areas of mathematics or related fields, the complex relationships between them and their development trends		The student knows and understands the fundamental principles of operation, as well as the capabilities and limitations, of artificial intelligence tools used in mathematics education, with reference to selected areas of mathematics.		[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion		

Subject contents	1. Foundations of artificial intelligence in education language models, capabilities and limitations of AI tools. 2. Techniques for using AI in the work of a mathematics teacher generating and adapting tasks, analysing students solutions, creating teaching materials. 3. AI in supporting students mathematical reasoning guiding questions, hints, personalised instruction. 4. Critical analysis of AI-generated responses typical errors, verification of reasoning correctness. 5. Risks and challenges academic dishonesty, factual errors, data protection, ethical use of AI. 6. Good practices and responsible use of AI principles of safe implementation, designing tasks resistant to misuse. 7. Practical workshops creating tasks, worksheets, error analyses and mini-lessons using AI. 8. Final project developing a teaching material using AI tools.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	observation of student's work	51.0%	0.0%
	exam	51.0%	60.0%
	project	51.0%	40.0%
Recommended reading	Basic literature	1. Walton Family Foundation & Gallup. (2025). <i>Teaching for Tomorrow: Unlocking Six Weeks a Year With AI</i>. 2. Tomczyk, Ł., & Fąka, A. (2025). <i>Integrating AI in Education: Polish Teachers</i>. Human Behavior and Emerging Technologies, 5599169. 3. Pyżalski, J. (2025). <i>Challenges for Education Based on Empirical Model of GAI in Schools</i>. Springer CCIS, 2537. 4. Polska Akademia Nauk. (2025). <i>Biała Księga: Sztuczna inteligencja w polskiej szkole</i>. 5. J. Mytnik, Edukacja w lustrze generatywnej sztucznej inteligencji: potencjalnie negatywne skutki dla procesu uczenia się., 2025r. 6. J. Mytnik, Gamifikacja w edukacji. O budowaniu fabularnych systemów motywacyjnych., 2025r. 7. J. Mytnik, B. Wikieł, M. Kaczmarek, A learning community model: the Center for Innovative Education supporting academic didactics at Gdańsk University of Technology, Poland, Global Journal of Engineering Education, 2024r. 8. W. Wątor, artykuły: I ty możesz wykorzystać sztuczną inteligencję, Sztuczna inteligencja sceptyczny punkt	
	Supplementary literature	1. Miao, F., & Cukurova, M. (2024). <i>AI Competency Framework for Teachers</i>. UNESCO. 2. Kestin, G., Miller, K., Klaes, A., Milbourne, T., & Ponti, G. (2025). <i>AI tutoring outperforms in-class active learning: an RCT</i>. Scientific Reports, 15, 17458. 3. Wang, J., Fan, W., et al. (2025). <i>Efekt ChatGPT na uczenie: meta-analiza 51 badań</i>. Humanities and Social Sciences Communications. https://doi.org/10.1038/s41599-025-04787-y . (doi.org in Bing)	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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