

Subject card

Subject name and code	Numerical algorithms, PG_00179417										
Field of study	Mathematical Modeling and Data Analysis										
Date of commencement of studies	October 2024	Academic year of realisation of subject		2025/2026							
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	2	Language of instruction		Polish polish language							
Semester of study	3	ECTS credits		6.0							
Learning profile	academic	Assessment form		exam							
Conducting unit											
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Andrzej Nowik								
	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		10.0		80.0	150				
Subject objectives	The aim of the course is to familiarize students with numerical computations, their applications, and the problems that arise when performing such calculations.										

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MMiADMU2_W01] knows and understands in-depth the theory of selected areas of mathematics	The student demonstrates advanced knowledge and understanding of the theoretical foundations of computational methods.	[SW1] oral statement/conversation/discussion
	[MMiADMU2_W02] knows and understands well the role and importance of the construction of mathematical reasoning	The student demonstrates a sound understanding of the role and importance of constructing mathematical reasoning.	[SW1] oral statement/conversation/discussion
	[MMiADMU2_U01] can construct mathematical reasoning: prove theorems and disprove hypotheses by constructions and selecting counterexamples	The student is able to construct mathematical reasoning: to prove theorems as well as to refute hypotheses by means of constructions and appropriate counterexamples.	[SU1] oral statement/conversation/discussion
	[MMiADMU2_K05] is ready to independently search for information in literature, also in foreign languages	The student is able to independently search for information in professional literature.	[SK2] presentation/project/paper/report
	[MMiADMU2_K04] is ready to understand and appreciate the importance of intellectual honesty in the actions of himself and others; is ready to act ethically	The student understands and appreciates the importance of intellectual honesty.	[SK8] observation of student's independent or team work
	[MMiADMU2_K02] is ready to precisely formulate questions to deepen his own understanding of a given topic or to find missing elements of reasoning	The student is able to formulate precise questions that deepen the understanding of a given topic.	[SK1] oral statement/conversation/discussion
	[MMiADMU2_U06] is able to apply methods and examples from a selected field of mathematics in related fields	The student is able to apply mathematical knowledge to formulate, analyze, and solve simple problems related to numerical methods.	[SU2] presentation/project/paper/report
	[MMiADMU2_U07] is able to define his interests and develop them; in particular, is able to establish contact with specialists in their field, e.g. understand their lectures intended for young mathematicians	The student is able to apply mathematical knowledge to formulate, analyze, and solve simple problems related to numerical methods	[SU2] presentation/project/paper/report
	[MMiADMU2_K01] is ready to recognize the limitations of his own knowledge and is ready to continue his education	The student is aware of the limitations of their own knowledge and demonstrates readiness for further education.	[SK8] observation of student's independent or team work
	[MMiADMU2_K06] is ready to form an opinion on basic mathematical issues	The student is prepared to formulate opinions on fundamental mathematical issues.	[SK8] observation of student's independent or team work
Subject contents	[MMiADMU2_U04] can, at an advanced level and including modern mathematics, apply and present in speech and in writing the methods of at least one selected branch of mathematics	The student is able to apply and present computational analysis methods at an advanced level, including contemporary mathematics. They are also able to identify their interests and develop them further.	[SU1] oral statement/conversation/discussion
	[MMiADMU2_U03] can understand mathematical texts from selected areas of mathematics	The student is able to understand mathematical texts of various types from selected areas of mathematics.	[SU8] observation of student's independent or team work
• Numerical computation errors • Systems of linear equations • Nonlinear equations • Interpolation • Functional approximation • Numerical integration			

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exam	51.0%	50.0%
	Laboratory completion	51.0%	50.0%
Recommended reading	Basic literature	Ratajczak, T. (2007). <i>Numerical Methods: Examples and Exercises</i> . Gdańsk: Gdańsk University of Technology Publishing House. Fortuna, Z., Macukow, B., & Wąsowski, J. (2006). <i>Numerical Methods</i> . Warsaw: WNT Publishing.	
	Supplementary literature	David Monniaux, The pitfalls of verifying floating-point computations. ACM Transactions on Programming Languages and Systems (TOPLAS), ACM, 2008, 30	
	eResources addresses		
Example issues/ example questions/ tasks being completed	N/A		
Work placement	Not applicable		

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