University of Gdańsk

Subject card

Subject name and code	Waving and Diffusion, PG_00179268						
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			
Semester of study	4		ECTS credits	5.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Milena Matusik				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	0.0	0.0	30.0	30
	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	30		5.0		90.0	125
Subject objectives	The aim is to prepare students to write a master's thesis.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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 express his/her views in mathematical discussion.	[SU1] oral statement/conversation/discussion
	[MMiADMU2_W07] knows and understands the basic legal and ethical conditions related to research and teaching	The student acquires knowledge of copyright and intellectual property.	[SW1] oral statement/conversation/discussion
	[MMiADMU2_U02] can express mathematical content in speech and in writing, in mathematical texts of various nature	The student is able to express mathematical content verbally and in vriting.	[SU2] presentation/project/paper/report
	[MMiADMU2_U03] can understand mathematical texts from selected areas of mathematics	The student acquires the ability to understand mathematical texts in a selected field of mathematics at advanced level.	[SU2] presentation/project/paper/report
	[MMiADMU2_U08] is able to in-depth preparation of texts in Polish and at least one foreign language, in a selected field of mathematics	The student is able to prepare a pressentation on a given topic in writing.	[SU2] presentation/project/paper/report
	[MMiADMU2_U09] can prepare in-depth oral presentations in Polish and at least in one foreign language in a selected field of mathematics	The student is able to prepare a presentation on a given topic.	[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 knows the limitations of his or her own knowledge and demonstrates readiness for further education.	[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 precisely formulate questions that serve to deepen understanding of a given topic.	[SK1] oral statement/conversation/discussion
	[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_K05] is ready to independently search for information in literature, also in foreign languages	The student is able to search for information in professional literature.	[SK2] presentation/project/paper/report
	[MMiADMU2_W03] knows and understands in-depth a selected field of theoretical or applied mathematics and is able to understand the formulations of issues in this field that are still being researched and knows the links between the issues of this field and other branches of mathematics	The student has in-depth theoretical knowledge of results and arguments in a chosen field of mathematics.	[SW2] presentation/project/paper/report
	[MMiADMU2_K06] is ready to form an opinion on basic mathematical issues	The student is able to formulate opinions on selected mathematical issues in applications.	[SK1] oral statement/conversation/discussion
	[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 methods from scope of selected applications of mathematics at an advanced level.	[SU2] presentation/project/paper/report
	[MMiADMU2_U05] is able to make proofs and analyzes in a given field, in which, if necessary, he also uses tools from other areas of mathematics	The student is able to apply the methods of a celected field of mathematics in argumentation and proof.	[SU2] presentation/project/paper/report
Subject contents	• Wave equations, difference schemes. • Differential equations in modeling biological phenomena. • Numerical approximations of the diffusion equations. • Differential equations in modeling physical phenomena.		
Prerequisites and co-requisites			

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Presentation</td><td>51.0%</td><td>80.0%</td></tr>
<tr><td>Activity in the discussion</td><td>51.0%</td><td>20.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>• L. C. Evans, Równania różniczkowe cząstkowe, PWN 2002.
• J. A. Trangenstein, Numerical Solution of Hyperbolic Partial Differential Equations. Cambridge, 2009.
• M. Schatzman, Numerical Analysis. A Mathematical Introduction. Oxford 2011.
• A. Fasano, M. Primicerio, Nonlinear Diffusion Problems, CIME, 1985.
• E. Platen, N. Bruti-Liberati, Numerical Solution of Stochastic Differential Equations with Jumps in Finance, Springer, 2010.</td></tr>
<tr><td>Supplementary literature</td><td>• K. Atkinson, W. Han "Theoretical Numerical Analysis", 2001, Springer-Verlag, NY..
• W. Walter, "Ordinary Differential Equations", 1998, Springer-Verlag, NY.
• Kincaid D., Cheney W. "Numerical analysis. Mathematics of scientific computing", 2009, AMS.
• Erwin Kreyszig, Advanced Engineering Mathematics, 2020, Wiley.
• J. D. Irwin, Mechanical Engineer's Handbook, 2001, Academic Press.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">n/a</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.