University of Gdańsk

Subject card

Subject name and code	Waving and diffusion, PG_00170078						
Field of study	Mathematics						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2024/2025			
Education level	Master's studies		Subject group	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	2		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	dr hab. Antoni Augustynowicz, prof. UG dr Milena Matusik					
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
[MATMU2_K05] is ready to independently search for information in literature, also in foreign languages	The student can independently search for information in professional literature.	[SK2] presentation/project/paper/ report
[MATMU2_U05] can perform proofs in a selected field and, if necessary, also use tools from other areas of mathematics	The student can apply the methods of a selected field of mathematics in argumentation and proof.	[SU2] presentation/project/paper/ report
[MATMU2_U04] is able, at an advanced level and including modern mathematics, to apply and present, orally and in writing, methods of at least one selected branch of mathematics	The student can apply and present methods of a selected branch of mathematics at an advanced level.	[SU2] presentation/project/paper/ report
[MATMU2_K04] is ready to understand and appreciate the importance of intellectual honesty in one's own and other people's actions; ethical conduct	The student understands and appreciates the importance of intellectual honesty.	[SK8] observation of student's independent or team work
[MATMU2_U09] can prepare oral presentations in-depth in Polish and at least one foreign language, in a selected field of mathematics	The student can prepare a paper and present it on a given topic.	[SU2] presentation/project/paper/ report
[MATMU2_U07] is able to define his/her interests and develop them; in particular, is able to establish contact with specialists in his/her field, e.g. understand their lectures intended for young mathematicians	The student can identify his or her interests in mathematical discussions.	[SU1] oral statement/conversation/ discussion
[MATMU2_U02] can express mathematical content in speech and writing, in mathematical texts of various nature	The student can express mathematical content orally and in writing in mathematical texts.	[SU2] presentation/project/paper/ report
[MATMU2_W07] knows and understands the basic legal and ethical conditions related to scientific and teaching activities	The student acquires knowledge about copyright and intellectual property.	[SW1] oral statement/ conversation/discussion
[MATMU2_K01] is willing to acknowledge the limitations of his or her own knowledge and is willing to pursue further 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
[MATMU2_K02] is ready to precisely formulate questions to deepen his/her understanding of a given topic or find missing elements of reasoning	The student can precisely formulate questions to deepen understanding of a given topic.	[SK1] oral statement/conversation/ discussion
[MATMU2_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 at the research stage and knows the connections of issues in this field with other areas of mathematics	The student has in-depth theoretical knowledge of results and arguments in a chosen field of mathematics.	[SW2] presentation/project/paper/ report
[MATMU2_U08] is able to prepare in-depth written works in Polish and at least one foreign language in a selected field of mathematics	The student can prepare a written presentation on a given topic.	[SU2] presentation/project/paper/ report
[MATMU2_U03] can understand mathematical texts of various types from selected fields of mathematics	The student acquires the ability to understand mathematical texts in a selected field of mathematics at an advanced level.	[SU2] presentation/project/paper/ report
[MATMU2_K06] is ready to formulate opinions on basic mathematical issues	The student can formulate opinions on mathematical issues.	[SK1] oral statement/conversation/ discussion

Subject contents

- Wave equations and differential diagrams.
- Differential equations in modeling biological phenomena.
- Numerical approximations of diffusion equations.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Presentation	51.0%	80.0%
Activity in the discussion	51.0%	20.0%

Recommended reading	Basic literature	• 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.
	Supplementary literature	• 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.
	eResources addresses	
Example issues/ example questions/ tasks being completed	n/a	
Work placement	Not applicable	

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