

Subject card

Subject name and code	Modeling in school mathematics, PG_00155421						
Field of study	Mathematics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	Bachelor'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	3		Language of instruction		Polish		
Semester of study	5		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 Mrozek				
	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		5.0		60.0	125
Subject objectives	The aim of the lecture is to discuss the most important mathematical concepts appearing in school mathematics and to familiarize students with the different methods of introducing these concepts depending on the level of education.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[MATL3_U01] is able to correctly use the known concepts of mathematical logic and set theory, is able - at a simple and medium level of difficulty - to apply the known theorems and methods of these fields and is able to interpret the obtained results	The student: • understands well the role and importance of constructing mathematical reasoning; • knows well the software packages used for symbolic calculations, statistical data processing, visualization and learning geometry. The student: • has the skills to construct mathematical reasoning: proving theorems and refuting hypotheses through the construction and selection of counterexamples; • is able to plan a mathematical project to model each of the mathematical concepts discussed during the lecture;	[SU2] presentation/project/paper/report [SU5] implementation of a problem task
	[MATL3_W05] knows and understands the basic concepts, methods and theorems of probability and statistics, as well as basic examples illustrating specific concepts in these fields and enabling the refutation erroneous hypotheses or unauthorized reasoning	The student: • understands well the role and importance of constructing mathematical reasoning; • knows well the software packages used for symbolic calculations, statistical data processing, visualization and learning geometry. The student: • has the skills to construct mathematical reasoning: proving theorems and refuting hypotheses through the construction and selection of counterexamples; • is able to plan a mathematical project to model each of the mathematical concepts discussed during the lecture;	[SW2] presentation/project/paper/report [SW5] implementation of a problem task
	[MATL3_U03] is able to correctly use the acquired concepts of linear algebra and geometry, is able - at a simple and medium level of difficulty - to apply the known theorems and methods in these fields and is able to interpret the obtained results	The student: • understands well the role and importance of constructing mathematical reasoning; • knows well the software packages used for symbolic calculations, statistical data processing, visualization and learning geometry. The student: • has the skills to construct mathematical reasoning: proving theorems and refuting hypotheses through the construction and selection of counterexamples; • is able to plan a mathematical project to model each of the mathematical concepts discussed during the lecture;	[SU2] presentation/project/paper/report [SU5] implementation of a problem task

	Course outcome	Subject outcome	Method of verification
	[MATL3_W02] knows and understands the basic concepts, methods and theorems of mathematical analysis as well as basic examples illustrating specific concepts in this field and enabling the refutation erroneous hypotheses or unauthorized reasoning	The student: - understands well the role and importance of constructing mathematical reasoning; - knows well the software packages used for symbolic calculations, statistical data processing, visualization and learning geometry. The student: - has the skills to construct mathematical reasoning: proving theorems and refuting hypotheses through the construction and selection of counterexamples; - is able to plan a mathematical project to model each of the mathematical concepts discussed during the lecture;	[SW2] presentation/project/paper/report [SW5] implementation of a problem task
	[MATL3_U07] is able to correctly use the acquired concepts of topology, is able - at a simple and medium level of difficulty - to apply the known theorems and methods of this field and is able to interpret the obtained results	The student: - understands well the role and importance of constructing mathematical reasoning; - knows well the software packages used for symbolic calculations, statistical data processing, visualization and learning geometry. The student: - has the skills to construct mathematical reasoning: proving theorems and refuting hypotheses through the construction and selection of counterexamples; - is able to plan a mathematical project to model each of the mathematical concepts discussed during the lecture;	[SU2] presentation/project/paper/report [SU5] implementation of a problem task
	[MATL3_K01] is ready to accept the limitations of his/her own knowledge and understands the need for further education	The student is ready to: - popularize knowledge among students and in the school environment and outside of school;	[SK5] implementation of a problem task [SK6] demonstration of practical skills
	[MATL3_K04] is ready to understand and appreciate the importance of intellectual honesty in one's own and other people's actions; is willing to act ethically	The student is ready to: - encourage students to develop curiosity, activity, and logical and critical thinking; - promote responsible and critical use of digital media and respect for intellectual property rights.	[SK5] implementation of a problem task [SK6] demonstration of practical skills
Subject contents	1. Modeling concepts in school mathematics - the position of modeling in school documentation (core curriculum, examination requirements, curricula) 2. Basic concepts of school mathematics and their modeling - natural numbers, fractions, integers - length, area and volume - function - probability 3. Visualization of selected mathematical concepts and mathematical theorems. 4. The role of DGS (dynamic geometry software) in shaping geometric intuitions. 5. Mathematical simulations and animations.		

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	observation of the student's attitude	51.0%	0.0%
	test	51.0%	60.0%
	project	51.0%	20.0%
	activity	51.0%	20.0%
Recommended reading	Basic literature	1. D. Haylock, Mathematics explained for primary teachers, SAGE, London 2010 2. S. Lang, Młodzi i macieka, GWO, Gdańsk 1995 3. J. Mason, L. Burton, K. Stacey, Mathematical thinking, WSiP, Warsaw 2005 4. A. Płocki, Probability calculus for teachers, PWN, Warsaw 1981 5. W. W. Sawyer, Figurative thinking in elementary mathematics, Wiedza Powszechna, Warsaw 1988 6. S. Turnau, Lectures on teaching mathematics, PWN, Warsaw 1990 7. P. Zarzycki, Modeling mathematical concepts, University of Gdańsk Publishing House, Gdańsk, 2019 8. Articles from magazines for teachers (Mathematics, Mathematics in School etc.)	
	Supplementary literature	not applicable	
	eResources addresses		
	Example issues/ example questions/ tasks being completed	not applicable	
Work placement	Not applicable		

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