

Subject card

Subject name and code	, PG_00174286						
Field of study	Mathematics						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2025/2026		
Education level	Bachelor's studies		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	6		ECTS credits		7.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Division of Topology -> Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Krzysztof Kowitz				
	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		0.0		0.0	30
Subject objectives	To learn and understand the most important concepts and tools in number theory, as well as to explore knowledge in some specific areas. The goal of the seminar is for students to acquire the knowledge, skills and mathematical competence necessary for further development in certain branches of number theory, as well as the ability to present selected topics to the rest of the group in an accessible manner. The seminar is also designed to teach students how to ask constructive questions.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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 understands the importance of intellectual honesty in his own and others' actions.	[SK1] oral statement/conversation/discussion
	[MATL3_K01] is ready to accept the limitations of his/her own knowledge and understands the need for further education	The student knows the limitations of his own knowledge and understands the need for further education.	[SK1] oral statement/conversation/discussion [SK8] observation of student's independent or team work
	[MATL3_K06] is ready to formulate opinions on basic mathematical issues	The student actively participates in the seminar.	[SK1] oral statement/conversation/discussion
	[MATL3_W14] knows and understands the basic concepts and principles of industrial property protection and copyright, is able to use patent information resources	The student acquires knowledge of copyright and intellectual property.	[SW1] oral statement/conversation/discussion
	[MATL3_W13] knows and understands the legal and ethical conditions related to scientific and teaching activities	The student acquires knowledge of legal and ethical considerations in scientific activity.	[SW1] oral statement/conversation/discussion
	[MATL3_K02] is ready to precisely formulate questions to deepen his/her own understanding of a given topic or to find missing elements of reasoning	Students are able to formulate questions to deepen their own understanding of a topic or to find missing elements of reasoning.	[SK1] oral statement/conversation/discussion [SK3] text preparation/written work [SK5] implementation of a problem task [SK8] observation of student's independent or team work
	[MATL3_U16] can speak about mathematical problems in understandable colloquial language	The student acquires the ability to express content orally and in writing, and is able to identify his interests in mathematical discussions.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU8] observation of student's independent or team work
	[MATL3_K05] is ready to independently search for information in literature, also in foreign languages	The student is able to independently search for information in the professional literature, preparing speeches before the group.	[SK1] oral statement/conversation/discussion [SK3] text preparation/written work [SK8] observation of student's independent or team work
	[MATL3_K09] is ready to critically evaluate arguments, find gaps in reasoning and constructively criticize other people's reasoning	The student is able to find gaps or errors in the reasoning of others and present them in a cultured manner.	[SK1] oral statement/conversation/discussion
	[MATL3_K10] is ready to analyze data and communicate the conclusions of such analysis in an accessible form	The student is able to analyze data and draw conclusions from it in an accessible form.	[SK1] oral statement/conversation/discussion [SK8] observation of student's independent or team work
	[MATL3_U15] has the ability to prepare oral presentations in Polish and at least one foreign language about selected mathematical issues using various sources of knowledge	The student knows how to prepare oral speeches, can prepare a paper and make a presentation on a given topic.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU8] observation of student's independent or team work
Subject contents	1. Modulo arithmetic and other basic tools of number theory. 2. Diophantine equations. 3. Catalan numbers and their applications. 4. Pell's equations. 5. Triangular numbers. 6. Pell-Lucas numbers. 7. Sophie-Germain theorem and Sophie Germain numbers. 8. Lockwood identity. 9. Brazilian numbers. 10. Generating functions.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Activity in the discussion	100.0%	0.0%
	Observation of student's attitude	100.0%	0.0%
	Written work (term paper)	51.0%	100.0%

Recommended reading	Basic literature	1. Dujella, Andrej, Number theory. Translated from the Croatian by Petra Svob, Manualia Universitatis Studiorum Zagabiensis, Zagreb: Skolska Knjiga, ISBN: 978-953-0-30897-8, 2021. 2. Schott, Bernard, Les nombres bresiliens, Quadrature 76, 3038, 2010. 3. Koshy, Thomas, Catalan numbers with applications, Oxford University Press, USA, 2008. 4. Koshy, Pell and Pell - Lucas Numbers with Applications, Springer Science+Business Media New York, USA, 2014. 5. Ribenboim, Paulo, Wielkie twierdzenie Fermata dla laików, Wydawnictwa Naukowo-Techniczne, Warszawa, 2001.
	Supplementary literature	1. Steuding, Jorn, Diophantine analysis, Discrete Mathematics and its Applications, ISBN: 1 58488-482-7, 2005. 2. Burger, Edward B., Exploring the number jungle: A journey into diophantine analysis, Student Mathematical Library, American Mathematical Society (AMS), vol. 8, ISBN: 0-8218 2640-9, 2000. 3. Sierpiński, Wacław, Elementary theory of numbers, vol. 42, PWN-Państwowe Wydawnictwo Naukowe, Warszawa, 1964. 4. Zarzycki, Piotr, Teoria liczb z programem Mathematica, Wydawnictwo Naukowe PWN, 2022. 5. Jon Grantham and Hester Graves, Brazilian primes which are also Sophie Germain primes, Integers 20, Paper No. A32, 4, 2020.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Is there an infinite Catalan prime numbers? 2. Theorem Sophie Germain. 3. Solving Diophantine equations and Pell's equations.	
Work placement	Not applicable	

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