University of Gdańsk

Subject card

Subject name and code	Diophantine Equations, PG_00208690		
Field of study	Mathematics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	6.0
Learning profile	academic	Assessment form	exam
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	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	To learn and understand the most important concepts and tools in number theory, as well as to explore knowledge in some specific areas. The aim of the course is to teach students how to solve Diophantine equations (ranging from the simplest linear ones to much more complex ones) and to introduce them to elliptic curves.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[MATL3_W09] knows and understands the role and importance of proof in mathematics, as well as the concept of the importance of assumptions	The student is able to construct a valid proof.	[SW4] test/exam - oral or written [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	The student is able to formulate questions designed to deepen their own understanding of a given topic or to identify gaps in their reasoning.	[SK1] oral statement/conversation/ discussion [SK8] observation of student's independent or team work
[MATL3_K01] is ready to accept the limitations of his/her own knowledge and understands the need for further education	The student is aware of the limitations of their own knowledge and understands the need for further education.	[SK1] oral statement/conversation/ discussion [SK8] observation of student's independent or team work
[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 integrity in their own actions and those of others.	[SK1] oral statement/conversation/ discussion
[MATL3_K06] is ready to formulate opinions on basic mathematical issues	The student actively participates in class.	[SK1] oral statement/conversation/ discussion
[MATL3_U09] is able to plan how to solve a specific problem and prepare a correct record of this solution, providing strict and precise justification for the correctness of his reasoning	The student is able to correctly solve the problem.	[SU4] test/exam - oral or written [SU8] observation of student's independent or team work
[MATL3_U08] is able to formulate definitions and theorems in an understandable way, both orally and in writing, and present correct mathematical reasoning regarding the acquired issues	The student is able to correctly formulate the definitions and theorems they have learned.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written [SU8] observation of student's independent or team work

Subject contents

1. Elliptic curves.

2. Linear Diophantine equations.

3. p-adic valuation.

4. Pell equation.

5. Mihailescu theorem.

6. Fermat's Last theorem.

7. Other Diophantine equations.

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%
written test	51.0%	50.0%
exam	51.0%	50.0%

Recommended reading	Basic literature	1. Dujella, Andrej, Number theory. Translated from the Croatian by Petra Svob, Manualia Universitatis Studiorum Zagrabiensis, Zagreb: Skolska Knjiga, ISBN: 978-953-0-30897-8, 2021. 2. Metsankyla, Tauno, Catalans Conjecture: another old Diophantine problem solved, Bull. Am. Math. Soc., New Ser. 41, No. 1, 43-57 (2004). 3. Steuding, Jorn, Diophantine analysis, Discrete Mathematics and its Applications, ISBN: 1 58488-482-7, 2005. 4. Koshy, Thomas, Pell and Pell - Lucas Numbers with Applications, Springer Science+Business Media New York, USA, 2014. 5. Burger, Edward B., Exploring the number jungle: A journey into diophantine analysis, Stu dent Mathematical Library, American Mathematical Society (AMS), vol. 8, ISBN: 0-8218 2640-9, 2000. 6. Ribenboim, Paulo, Wielkie twierdzenie Fermata dla laików, Wydawnictwa Naukowo Techniczne, Warszawa, 2001. 7. Dujella, Andrej, Diophantine m-tuples and Elliptic Curves, Manualia Universitatis Studiorum Zagrabiensis, Zagreb: Skolska Knjiga, ISBN 978-3-031-56723-0, 2024.
	Supplementary literature	1. 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. 2. Sierpiński, Wacław, Elementary theory of numbers, vol. 42, PWN-Państwowe Wydawnictwo Naukowe, Warszawa, 1964. 3. Zarzycki, Piotr, Teoria liczb z programem Mathematica, Wydawnictwo Naukowe PWN, 2022.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Solving Diophantine equations and Pell's equations. 2. Brocard-Ramanujan equation.	
Work placement	Not applicable	

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