

Subject card

Subject name and code	Number theory, PG_00178999						
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		Optional subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish the course could be given in English		
Semester of study	6		ECTS credits		6.0		
Learning profile	academic		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Ewa Kozłowska-Walania				
	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	The goal of the course is to get the students acquainted with the basic notions, theorems and methods of elementary number theory						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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 precisely formulates questions concerning elementary number theory and strives to deepen knowledge by supplementing incomplete reasoning.	[SK1] oral statement/conversation/discussion [SK3] text preparation/written work [SK4] test/exam - oral or written [SK6] demonstration of practical skills [SK8] 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	Student is able to formulate definitions and theorems in an understandable manner, both orally and in writing, and independently present correct mathematical reasoning concerning topics from the lecture, e.g. investigate the properties of a given object, construct an example with specific properties, or provide an appropriate counterexample.	[SU3] text preparation/written work [SU4] test/exam - oral or written [SU5] implementation of a problem task
	[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	Student is able to independently analyse, solve and present an issue related to the lecture topics.	[SU1] oral statement/conversation/discussion [SU3] text preparation/written work [SU4] test/exam - oral or written
	[MATL3_K01] is ready to accept the limitations of his/her own knowledge and understands the need for further education	Student feels the need to individually enhance the knowledge got during the lecture	[SK1] oral statement/conversation/discussion [SK3] text preparation/written work [SK8] observation of student's independent or team work
	[MATL3_W09] knows and understands the role and importance of proof in mathematics, as well as the concept of the importance of assumptions	Student knows the proofs, or sketches of them, relating to the topic of the lecture.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW3] text preparation/written 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	Student acts honestly and ethically in all aspects relating to passing the subject.	[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 expresses his/her opinion on the basic problems of elementary number theory	[SK1] oral statement/conversation/discussion [SK6] demonstration of practical skills
Subject contents	- Properties of divisibility relation defined on the set of integers. - Euclidean algorithm. - Prime numbers. - Congruences and their properties. - Quadratic reciprocity law. - Basic Diophantine equations. - Continued fractions and their properties. - Approximating real numbers by rational numbers. - Arithmetic functions - algebraic properties and analytic properties.		
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%	45.0%
	Written or oral exam	51.0%	50.0%
	Activity points	51.0%	5.0%
Recommended reading	Basic literature	W. Marzantowicz, P. Zarzycki, <i>Elementarna teoria liczb</i>, PWN, Warszawa 2006 W. Narkiewicz, <i>Teoria liczb</i>, PWN, Warszawa 1990 J. Rutkowski, <i>Teoria liczb w zadaniach</i>, PWN, 2018	

	Supplementary literature	1. L. K. Hua, <i>Introduction to Number Theory</i>, Springer, 1982 2. H. Davenport, <i>The Higher Arithmetic</i>, Cambridge University Press, 2008 3. Yan Song Y., <i>Teoria liczb w informatyce</i>, PWN, 2006
	eResources addresses	
Example issues/ example questions/ tasks being completed	State and prove Euler's theorem. State and prove Binet's formula. Give a necessary and sufficient condition on the existence of a solution of a diophantic equation of the form $nx+my=k$. Knowing, that the pair (5,-11) is a solution to the equation $18x+7y=13$, give a formula for all the integer solutions of this equation State the definition of Euler's function and prove its multiplicativity. Compute $\phi(624)$. Using the numbers $a=12378$ and $b=3054$ as an example, demonstrate the Euclid's algorithm and determine the integers n,m such that $na+mb=(n,m)$	
Work placement	Not applicable	

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