



Subject card

Subject name and code	, PG_00055430						
Field of study	Mathematics						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2022/2023		
Education level	second-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Karol Dziedziul					
	Teachers	dr hab. Karol Dziedziul dr Wojciech Czernous					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	15.0	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	Getting to know the models of the derivative market and mathematical modeling.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_U10	The student is able to correctly present the advanced methods of stochastic analysis. Can put emphasis on correct intuition			[SU4] Assessment of ability to use methods and tools		
	K7_W07	The student knows how to evaluate options in a discrete model using the Martingale method and using hedging.			[SW3] Assessment of knowledge contained in written work and projects		
	K7_K04	Working on the first chapters of Hull allows for future job interviews to present the main ideas of financial mathematics in English. The student can speak about advanced methods of financial analysis.			[SK4] Assessment of communication skills, including language correctness		
K7_U09	Student can be able to price of any non-standard option in the Black Scholes model			[SU1] Assessment of task fulfilment			
Subject contents	Discrete model: self-financing portfolio, arbitrage. Equivalence theorem of local martingales, generalized martingales, martingales transformations. Theorem on the existence of a martingale measure for markets without arbitrage. Esher Lemma. Continuous models. Stochastic differential equations, Equations with affine coefficients solved exact. Numerical solutions. Standard Black Scholes model Heston model. Short-term rate models, Vasick's model.						
Prerequisites and co-requisites	Probability theory. Measure theory						
Assessment methods and criteria	Subject passing criteria	Passing threshold			Percentage of the final grade		
		60.0%			100.0%		

Recommended reading	Basic literature	<p>1. J. Jakubowski, A. Palczewski, M. Rutkowski, Ł. Stettner „Matematyka finansowa Wydawnictwo Naukowo-Techniczne 2003.</p> <p>2. J. Hull „ Options, Futures, and the Other Derivatives Englewood Cliffs, Prentice-Hall 2007</p> <p>3. A.N. Shiryaev „Essentials of Stochastic Finance:Facts, Models, Theory Singapore, World Scientific 1999</p>
	Supplementary literature	.A. Brealey, S.C. Myers, Principles of Corporate finance McGraw Hill
	eResources addresses	Adresy na platformie eNauczanie: Kontakty terminowe - Moodle ID: 26747 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26747
Example issues/ example questions/ tasks being completed	Determine the value of a financial instrument $(S_T - K)^2$	
Work placement	Not applicable	