



## Subject card

Subject name and code	Risk Processes, PG_00044138						
Field of study	Mathematics						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Divison of Dynamical Systems -> Institute of Applied Mathematics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Sergey Kryzhevich				
	Teachers		dr hab. Sergey Kryzhevich				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	30.0	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	Introduction of basic mathematical tools related to risk modeling in terms of stochastic (Markov) processes and stochastic differential equations.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
Subject contents	Markovian processes with discrete time. Elements of the Itô integral. Stochastic differential equations. Standard risk models in terms of stochastic differential equations. The Heath, Jarrow and Morton model. Reduced insolvency risk model. During the seminars accompanying the lecture, students will present issues related to survival analysis.						
Prerequisites and co-requisites	Assessment in the following subjects: probability calculus, stochastic processes						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Project		51.0%		50.0%		
	Exam		51.0%		50.0%		
Recommended reading	Basic literature		1. Steven E. Shreve, Stochastic Calculus for Finance II. Continuous-Time Models. Springer, 2004. 2. Robert A. Jarrow, Continuous-Time Asset Pricing Theory. A Martingale-Based Approach. Springer, 2018. 3. D.G. Kleinbaum, M. Klein, Survival Analysis, A Self-Learning Text, (3rd Edition), Springer				

	Supplementary literature	<ol style="list-style-type: none"> <li>1. Olav Kallenberg, Foundations of Modern Probability. Springer, 2002.</li> <li>2. Ioannis Karatzas and Steven E. Shreve. Brownian Motion and Stochastic Calculus. Springer, 1991.</li> <li>3. Tomasz R. Bielecki, Marek Rutkowski, Credit Risk: Modeling, Valuation and Hedging, Springer, 2004.</li> </ol>
	eResources addresses	<p>Podstawowe</p> <p><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38042">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38042</a> - The Risk Processes course at e-nauczanie platform</p> <p>Adresy na platformie eNauczanie:</p>
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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