

Subject card

Subject name and code	Analysis of Financial Instruments, PG_00179791						
Field of study	Mathematical Modeling and Data Analysis						
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	5		ECTS credits		6.0		
Learning profile	academic		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Milena Matusik				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	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		0.0		0.0	60
Subject objectives	To familiarize students with actual rates and instruments occurring in financial markets and issues related to risk measurement.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MMiADL3_W09] knows and understands the basics of computational and programming techniques supporting mathematician's work and understands their limitations		The student knows of the basic components, structures of the selected programming language and can apply them to speed up calculations or facilitate the analysis of the selected model.		[SW2] presentation/project/paper/report [SW5] implementation of a problem task		
	[MMiADL3_U11] knows how to arrange and analyse an algorithm in accordance with the specification and save it in the selected programming language		The student can implement selected algorithms and functions with a given specification in a selected programming language.		[SU2] presentation/project/paper/report [SU5] implementation of a problem task		
	[MMiADL3_U10] is able to recognise problems, including practical issues, that can be solved algorithmically; can make a specification of such a problem		The student can implement an appropriate algorithmic solution to a practical problem related to selected financial instruments.		[SU2] presentation/project/paper/report [SU5] implementation of a problem task		
	[MMiADL3_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 can precisely formulate questions that serve to deepen the understanding of a given topic.		[SK1] oral statement/conversation/discussion [SK8] observation of student's independent or team work		

Subject contents	1. Analysis of interest rates based on the example of interbank reference rates WIBOR, LIBOR, EURLIBOR. 2. Loan rates with variable interest rates based on reference rates. 3. Selected term structures of interest rates. 4. Basic debt instruments including bonds - clean price, dirty price of bonds, duration, modified duration, convexity based on examples from the market. 5. Construction of yield curves based on risk-free instruments and reference rates. 6. Review of futures contracts - FRA, IRS contracts. 7. European, American, barrier, knock-in-and-up options (CRR model and Black-Scholes model, Greek indicators). 8. Selected issues related to risk assessment including VaR.		
Prerequisites and co-requisites	Knowledge of the basics of mathematical analysis I and II, probability theory and an introduction to programming.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	project	51.0%	20.0%
	exam	51.0%	40.0%
	tests	51.0%	40.0%
Recommended reading	Basic literature	1. Rynki kapitałowe. Matematyka finansowa I, P. Jaworki, K. M. Jaworska, wersja internetowa wykładu: http://mst.mimuw.edu.pl/lecture.php?lecture=rka 2. Modelowanie matematyczne w finansach i ubezpieczeniach, P. Jaworski, J. Micał, Poltext, Warszawa 2005 3. Inżynieria finansowa, R. Weron, WNT, Warszawa. 4. Options Futures and others Derivatives, J. C. Hull, Prentice Hall International, London	
	Supplementary literature	1. Modele matematyki finansowej, instrumenty podstawowe, K. Piasecki, PWN, 2007.	
	eResources addresses	Basic http://mst.mimuw.edu.pl/lecture.php?lecture=rka - Lecture: Rynki kapitałowe. Matematyka finansowa I, P. Jaworski, K. M. Jaworska.	
Example issues/ example questions/ tasks being completed	None.		
Work placement	Not applicable		

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