

Subject card

Subject name and code	Life Insurance Data Analysis, PG_00174265						
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 introduce students to basic concepts and facts in the mathematics of life insurance.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[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 is able to implement an appropriate algorithmic solution to a practical problem related to the mathematics of life insurance.		[SU2] presentation/project/paper/report [SU5] implementation of a problem task		
	[MMiADL3_W09] knows and understands the basics of computational and programming techniques supporting mathematician's work and understands their limitations		The student has knowledge of the basic components and structures of a selected programming language and is able to apply them to speed up calculations or facilitate the analysis of a 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 is able to 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_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 precisely formulate questions that serve to deepen understanding of a given topic.		[SK1] oral statement/conversation/discussion [SK8] observation of student's independent or team work		
Subject contents	1. Elements of financial mathematics - interest rates, standard payment sequences. 2. Life expectancy - fractional life expectancy and its interpolation. 3. Life insurance - single net premium in continuous and discrete insurance. 4. Life annuities - actuarial present value of continuous and discrete annuities. 5. Standard insurance and net premiums. 6. Net mathematical reserves - loss sharing in annual policies, Hattendorff's theorem. 7. Multiple losses, group policies. 8. Commutation functions. 9. Gross mathematical reserve.						

Prerequisites and co-requisites	Possess knowledge at the level of mathematical analysis I and II, probability theory and 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%
	test	51.0%	40.0%
Recommended reading	Basic literature	1. J. Czarnowska, K. Dziedziul, Ubezpieczenia na życie i komunikacyjne, Wyd. Politechniki Gdańskiej, 2010. 2. B. Błaszczyszyn, T. Rolski, Podstawy matematyki ubezpieczeń na życie, WNT, 2004. 3. N. Bowers, H. Gerber, J. C. Hickman, D. A. Jones, C. J. Nesbitt, Actuarial Mathematics, The Society of Actuaries, 1986. 4. H. Gerber, Life insurance mathematics, Springer, 1995. 5. A. Leung, Actuarial Principles. Lifetables and mortality models, Academic Press, 2022.	
	Supplementary literature	1. M. Skalba, Ubezpieczenia na życie, WNT, 1999. 2. P. Jaworski, J. Micał, Modelowanie matematyczne w finansach i ubezpieczeniach, Poltext, 2005.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	None.		
Work placement	Not applicable		

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