



Subject card

Subject name and code	Actuarial mathematics, PG_00055429						
Field of study	Mathematics						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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			blended-learning		
Year of study	1	Language of instruction			Polish Polish (English if necessary)		
Semester of study	2	ECTS credits			4.0		
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	mgr Piotr Lebieź					
	Teachers	mgr Piotr Lebieź					
Lesson types and methods of instruction	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: 30.0						
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		35.0	100	
Subject objectives	The aim of the course is to familiarize students with and stimulate their interest in the topic of actuarial mathematics, focusing on the concept of time value of money and basic life insurance structures, including calculating expected remaining lifetimes, reserves, and insurance premiums.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W02] Has good understanding of the role and importance of mathematical reasoning structure.	Students have a solid understanding of the role and significance of various mathematical constructions related to loans, interest rates, and different types of life insurance. Student are capable of independently reasoning to formulate formulas and solve problems based on given assumptions.	[SW1] Assessment of factual knowledge
	[K7_W05] Has enhanced knowledge of a selected branch of mathematics: knows most classical definitions and theorems and their proofs, Understands problems being examined, Knows relations between problems from particular field with other branches of mathematics, theoretical and applied	Students have a good understanding of the mathematical disciplines from which actuarial mathematics originates, as well as its basic definitions and theorems. They can formulate and modify them based on varying assumptions.	[SW1] Assessment of factual knowledge
	[K7_K02] Can precisely formulate questions to deepen own understanding of a given topic or find missing elements of reasoning, understands the need to clearly present selected achievements of higher mathematics to laymen.	Students understand the importance of insurance in every individual's life, the benefits they provide, and the costs they may entail. They comprehend the role of time in assessing the value of money. Student are aware of which aspects they should further explore to develop their knowledge in the field of actuarial mathematics.	[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice
[K7_U08] Knows probability distributions and their properties; is able to use them in practical issues, is familiar with the basics of statistics (estimation issues and hypothesis testing) and the basics of statistical data processing.	Students are familiar with probabilistic distributions related to life insurance mathematics, including the de Moivre, exponential, and Weibull distributions. They are capable of applying statistics to estimate remaining lifetimes, calculate reserves, and insurance premiums.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task	
Subject contents	<p>The lectures and exercises are conducted according to the following list of topics:</p> <ol style="list-style-type: none"> 1. Introduction to the basics of the insurance market 2. Elementary concepts of financial mathematics 3. Various loan structures 4. Additional tasks in financial mathematics 5. Life expectancy 6. Life insurance 7. Life annuities 8. Calculation of net premiums 9. Net reserves 10. Group policies 		
Prerequisites and co-requisites	<p>Knowledge of the basics:</p> <ol style="list-style-type: none"> 1. probability theory, 2. statistics, 3. mathematical analysis. 		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Activity	0.0%	10.0%
	2 exams	50.0%	90.0%

Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. J. Czarnowska, K. Dziedziul, "Ubezpieczenia na życie i komunikacyjne", Wyd. Politechnika Gdańska, Gdańsk, 2012 2. B. Błaszczyszyn, T. Rolski, "Podstawy matematyki ubezpieczeń na życie", Wyd. Naukowo-Techniczne, Warszawa, 2004 3. H.U. Gerber, "Life insurance mathematics", Wyd. Springer-Verlag, Berlin, Heidelberg, New York, 1995 4. M. Skalba, "Ubezpieczenia na życie", Wyd. Naukowo-Techniczne, Warszawa, 2003
	Supplementary literature	<ol style="list-style-type: none"> 1. J. Jakubowski, R. Sztencel, "Wstęp do rachunku prawdopodobieństwa", Wyd. Script, Warszawa, 2001
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Matematyka aktuarialna 2024 - Moodle ID: 37838 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37838</p>
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Calculating interest rates 2. Calculating the value of money at different points in time 3. Calculating loan installments with given parameters 4. Calculating remaining life expectancy 5. Calculating reserves for various life insurance policies 6. Calculating premiums for various life insurance policies 	
Work placement	Not applicable	