GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Actuarial mathematics, PG_00055429		
Field of study	Mathematics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Specialty 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 Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Applied Mathematics -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Marcin Szatkowski	
	Teachers	dr Marcin Szatkowski	

Lesson types

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: 0.0

eNauczanie source addresses:

Moodle ID: 5477 Matematyka aktuarialna
https://enauczanie.pg.edu.pl/2025/course/view.php?id=5477

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 engage them in the field of actuarial mathematics, particularly in the area of the time value of money and the fundamental structures of life insurance, including the calculation of expected future lifetime as well as insurance reserves and premiums.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K02] formulates 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.	The student understands the importance of insurance in everyone's life, the benefits it provides, and the costs it may involve. The student understands the role of time in valuing money. They are also aware of which areas they should further explore in order to develop their knowledge of actuarial mathematics.	[SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness
[K7_W02] has enhanced knowledge of a selected branch of mathematics,theoretical or applied, knows classical definitions and theorems and their proofs and connections with other fields,understands problems being examined	The student has a strong understanding of the mathematical fields from which actuarial mathematics originates, as well as its fundamental definitions and theorems. They are able to formulate and modify them based on changing assumptions.	[SW1] Assessment of factual knowledge
[K7_U06] uses probability distributions and their properties in practical issues, is familiar with the basics of statistics and the basics of statistical data processing	The student is familiar with probability distributions used in life insurance mathematics, including the de Moivre, exponential, and Weibull distributions. The student is able to apply statistical methods to estimate future lifetime, as well as to calculate insurance reserves and 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
[K7_W01] has enhanced knowledge of basic branches of mathematics,demonstrates knowledge theorem and hypotheses, has understanding of the role and importance of mathematical reasoning structure.	The student has a solid understanding of the role and importance of various mathematical constructs related to loans, interest rates, and different types of life insurance. They are able to carry out independent reasoning to formulate formulas and solve problems based on given assumptions.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

Lectures and tutorials are conducted in accordance with the following list of topics:

1. Overview of the insurance market fundamentals
2. Elementary topics in financial mathematics
3. Various loan structures
4. Additional problems in financial mathematics
5. Future lifetime
6. Life insurance
7. Life annuities
8. Calculation of net premiums
9. Net reserves
10. Group insurance policies

Course content – exercises

Lectures and tutorials are conducted in accordance with the following list of topics:

1. Overview of the insurance market fundamentals
2. Elementary topics in financial mathematics
3. Various loan structures
4. Additional problems in financial mathematics
5. Future lifetime
6. Life insurance
7. Life annuities
8. Calculation of net premiums
9. Net reserves
10. Group insurance policies

Prerequisites and co-requisites

Knowledge of the fundamentals of:

1. probability theory,
2. statistics,
3. mathematical analysis.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td></td><td>50.0%</td><td>90.0%</td></tr>
<tr><td></td><td>0.0%</td><td>10.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>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. Skałba, "Ubezpieczenia na życie", Wyd. Naukowo-Techniczne, Warszawa, 2003</td></tr>
<tr><td>Supplementary literature</td><td>1. J. Jakubowski, R. Sztencel, "Wstęp do rachunku prawdopodobieństwa", Wyd. Script, Warszawa, 2001</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Calculation of interest rates
2. Calculation of the value of money at different points in time
3. Calculation of loan installments for given parameters
4. Calculation of future lifetime
5. Calculation of reserves for various life insurance products
6. Calculation of premiums for various life insurance products</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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