

**Subject card**

<b>Subject name and code</b>	Elements of Financial Mathematics, PG_00148202						
<b>Field of study</b>	Insurance - Interdisciplinary Studies						
<b>Date of commencement of studies</b>	October 2024	<b>Academic year of realisation of subject</b>			2024/2025		
<b>Education level</b>	Master's studies	<b>Subject group</b>			Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	1	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	2	<b>ECTS credits</b>			3.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			credit		
<b>Conducting unit</b>	Department of Econometrics -> Faculty of Management -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr hab. Ewa Wycinka				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	15.0	15.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	<b>Number of study hours</b>	30		10.0		35.0	75
<b>Subject objectives</b>	Understanding the principles of calculating the value of capital over time. Using the learned principles to: determine the value of capital at any given moment, update a series of payments to any point in time (planning regular savings and withdrawals), prepare a debt repayment plan.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[UBEZMU2_U03] The student has developed skills to understand and analyze socio-economic phenomena, including by formulating and testing hypotheses related to insurance research problems.	The student has the ability to perform financial analysis of various investment instruments and projects	[SU4] test/exam - oral or written
	[UBEZMU2_U01] The student has in-depth skills of observation and interpretation of phenomena related to economic and legal aspects of insurance, including the use of advanced information and communication techniques, and is able to integrate knowledge from various scientific disciplines.	The student is able, in compliance with the principles of financial mathematics, to calculate the value of capital at any point in time, taking inflation into account, to plan regular savings and withdrawals from accumulated capital, to draw up a loan repayment plan.	[SU4] test/exam - oral or written
	[UBEZMU2_K03] The student thinks creatively, is able to go beyond the usual patterns, is able to think and act in an entrepreneurial manner, is able to adapt flexibly to the requirements of the environment.	The student has the ability to make financial decisions based on mathematical analysis to evaluate different investment and financial strategies.	[SK4] test/exam - oral or written
	[UBEZMU2_W08] The student knows the methods and tools, including data and information acquisition techniques, appropriate to the field of insurance and related disciplines.	Students will be familiar with methods for calculating the value of capital at any moment in nominal and real terms and methods for updating the payment sequence at any moment.	[SW4] test/exam - oral or written
	[UBEZMU2_K01] The student is critically aware of the level of his knowledge and skills, recognizes the importance of knowledge in solving cognitive and practical problems in the field of insurance, consults experts in case of difficulties in solving the problem independently.	[UBEZMU2_K01] The student is critically aware of the level of his knowledge and skills, recognizes the importance of knowledge in solving cognitive and practical problems in the field of insurance, consults experts in case of difficulties in solving the problem independently. The student understands the need to continuously improve and expand the acquired knowledge; he/she is prepared to further expand his/her knowledge in the field of financial mathematics. He/she is able to communicate his/her knowledge and share his/her skills.	[SK4] test/exam - oral or written
	[UBEZMU2_U06] The student is able to independently plan and implement his own lifelong learning and lead others in doing so.	Students are able to independently improve their knowledge of financial mathematics.	[SU4] test/exam - oral or written

Subject contents	<p>1. Principle of simple interest revaluation of capital, equivalence of capitals, average interest rate, real simple discount, commercial (bank) simple discount, condition of equivalence of interest and discount rate, principles of bill of exchange clearing.</p> <p>2. Principle of compound interest revaluation of capital, equivalence of capital, equivalence of interest terms, nominal and effective interest rate, average interest rate, interest intensity, compounded real discount, compounded commercial discount, interest rate and discount rate equivalence condition.</p> <p>3. Impact of inflation on the purchasing power of capital monthly, quarterly and annual inflation rates, average inflation rate, real interest rate, real value of capital.</p> <p>4. Annuity accounting for time and perpetual annuities, annuities payable in arrears and in advance, deferred annuities, value of annuities at any point in time, equivalence of annuities, planning regular savings and withdrawals from capital.</p> <p>5. Debt repayment by instalments of interest and principal, debt repayment plan with fixed payment amounts, debt repayment plan with fixed capital instalments.</p> <p>6. Test</p>								
Prerequisites and co-requisites									
Assessment methods and criteria	<table border="1" data-bbox="450 974 1489 1034"> <thead> <tr> <th data-bbox="450 974 794 1003">Subject passing criteria</th> <th data-bbox="794 974 1139 1003">Passing threshold</th> <th data-bbox="1139 974 1489 1003">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="450 1003 794 1034">colloquium</td> <td data-bbox="794 1003 1139 1034">51.0%</td> <td data-bbox="1139 1003 1489 1034">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	colloquium	51.0%	100.0%
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colloquium	51.0%	100.0%							
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Bieszk-Stolorz B., Matematyka finansowa z arkuszem kalkulacyjnym, CEDEWU, Warszawa 2021.</li> <li>2. Wycinka E., Szreder M. (red.), Zastosowanie metod ilościowych w ubezpieczeniach, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2020.</li> <li>3. Redo M., Prewszyn-Kwitno P., Matematyka finansowa. Teoria i praktyka, PWN, Warszawa 2021.</li> </ol>							
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Adamczak A., Majerowska M., Matematyka finansowa w przykładach, WSiFiR, Sopot 2003;</li> <li>2. Dobija M., Smaga E., Podstawy matematyki finansowej i ubezpieczeniowej, PWN 1995;</li> <li>3. Kozubski J., Matematyczne modelowanie wybranych procesów finansowych, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk, 2002;</li> <li>4. Podgórska M., Klimkowska J., Matematyka finansowa, PWN, Warszawa 2005;</li> <li>5. Sobczyk M., Matematyka finansowa, Agencja Wydawnicza Placet, Warszawa 2000</li> </ol>							
	eResources addresses								
Example issues/ example questions/ tasks being completed									
Work placement	Not applicable								

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