

Subject card

Subject name and code	Mathematics II, PG_00178082						
Field of study	Informatics and Econometrics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	Bachelor's studies		Subject group		Obligatory subject group 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		
Semester of study	2		ECTS credits		5.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Statistics -> Faculty of Management -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Beata Jackowska				
	Teachers		dr Anna Gierusz-Matkowska mgr Tomasz Jastrzębski Maciej Chyliński dr Lech Kujawski				
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						
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		4.0		61.0	125
Subject objectives	Familiarization with the principles of calculating the time value of capital. Application of these principles to: determining the value of capital at any point in time, updating a series of payments to any given moment, preparing a debt-repayment schedule, evaluating investment projects, valuing debt instruments, performing basic actuarial calculations.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[IiEL3_U02] Students can select or construct econometrics, informatics or statistics tools and apply them to describe and solve economic and social problems.		The student is able to calculate the value of capital at any time, taking into account inflation, plan regular savings and withdrawals from the accumulated capital, prepare a loan repayment schedule, evaluate an investment project, and value financial instruments using the discounted cash flow method, in accordance with the principles of financial mathematics.		[SU3] text preparation/written work [SU4] test/exam - oral or written		
	[IiEL3_W02] To an advanced degree, the student knows and understands selected theoretical and practical issues in informatics, statistics or econometrics necessary for understanding economic and social phenomena.		The student knows and understands the methods of calculating the value of capital at any point in time in nominal and real terms and the methods of updating the payment sequence at any point in time.		[SW4] test/exam - oral or written [SW3] text preparation/written work		

Subject contents	1. Simple interest: capital value update, equivalence of capitals, average rate of interest, simple (true) discount, simple commercial (bankers) discount, equivalence condition between interest rate and discount rate, rules for settling bills of exchange 2. Compound interest: capital value update, equivalence of capitals, equivalence of interestrate conditions, average rate of interest, force of interest, compound (true) discount, compound commercial discount, equivalence condition between interest rate and discount rate. Impact of inflation on purchasing power of capital: periodic inflation rate, average inflation rate, real value of capital. 3. Annuity calculations: term annuity and perpetuity, annuity-immediate and annuity-due, deferred annuity, synchronous annuity (payments aligned with the interestconversion period) and asynchronous annuity (payments not aligned), annuity with fixed payments, annuity with varying payments, value of an annuity at any point in time, equivalence of annuities. 4. Instalment-based debt repayment: principal and interest repayments, debt repayment schedule with level principal instalments, debt repayment schedule with level total payments, loans with a deferred repayment period (grace period), cost of debt 5. Investment project evaluation methods: cash flow projection, average duration, payback period, investment return ratio, internal rate of return, modified internal rate of return, investment project acceptance criteria 6. Valuation of financial instruments by the discounted cash flow method 7. Statistical descriptive measures of the distributions of insurance characteristics, market concentration (essence of market concentration, selected concentration metrics, concentration curves), modeling insurance phenomena using probability distributions.		
Prerequisites and co-requisites	Knowledge of the following subjects: mathematics I, statistics I. Students should have elementary knowledge of mathematical analysis, probability calculus and statistics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Assessment on the basis of written partial colloquia covering solving exercises and theory.	51.0%	100.0%
Recommended reading	Basic literature	1. Podgórska M., Klimkowska J., Matematyka finansowa, PWN, Warszawa 2000. 2. Sobczyk M., Matematyka finansowa, Agencja Wydawnicza Placet, Warszawa 2000. 3. Wycinka E., Szreder M. (red.), Zastosowanie metod ilościowych w ubezpieczeniach, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2020. 4. Bieszk-Stolorz B., Matematyka finansowa z arkuszem kalkulacyjnym, CEDEWU, Warszawa 2021. 5. Redo M., Prewszyn-Kwitno P., Matematyka finansowa. Teoria i praktyka, PWN, Warszawa 2021.	
	Supplementary literature	1. Dobija M., Smaga E., Podstawy matematyki finansowej i ubezpieczeniowej, PWN 1995. 2. Kozubski J., Matematyczne modelowanie wybranych procesów finansowych, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk, 2002.	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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