University of Gdańsk

Subject card

Subject name and code	Mathematics II, PG_00178082		
Field of study	Informatics and Econometrics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
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		

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] 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] Knows and understands, to an advanced degree, 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

<table>
<tr><td>Subject contents</td><td>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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of the following subjects: mathematics I, statistics I. Students should have elementary knowledge of mathematical analysis, probability calculus and statistics.</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Assessment on the basis of written partial colloquia covering solving exercises and theory.</td><td>51.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>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.</td></tr><tr><td>Supplementary literature</td><td>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.</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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