GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	FINANCIAL MATHEMATICS, PG_00070979		
Field of study			
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	English
Semester of study	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Finance -> Faculty of Management and Economics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Ewa Mazurek-Krasodomska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	30.0	0.0	0.0	0.0	45

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	45	3.0	52.0	100

Subject objectives

Preparation of students to solve decision-making problems in finance using the tools of financial mathematics, based on knowledge of the time value of money and methods of valuing financial instruments, as well as the development of attitudes related to logical thinking and the precise formulation of solutions in the context of economic analyses.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U04] develops logical solutions to complex or unstructured problems, even under conditions of uncertainty.	is able to perform calculations related to the valuation of financial instruments using appropriate mathematical models (interest, discounting, capitalization, annuity calculus) and analyze their impact on the future and present value of cash flows	[SU2] Assessment of ability to analyse information
[K6_W02] possesses advanced knowledge of methods and techniques that enable precise formulation and effective problem solving.	knows and understands the principles of the mathematical description of the time value of money, with particular emphasis on various interest rate models, discounting methods, and annuity calculus, in the context of analyzing financial and economic decisions	[SW1] Assessment of factual knowledge
[K6_K03] is prepared to critically assess the knowledge they possess, which is necessary for solving cognitive and practical problems, and to supplement any gaps with opinions from external experts.	is ready to critically evaluate their knowledge in financial mathematics in the context of solving cognitive and practical problems, particularly by verifying the validity of underlying assumptions and identifying limitations of applied financial models	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents

Course content – lecture

1. Time value of money in the context of simple interest and compound interest.
2. Equivalent, effective, and average interest rates vs. the discount rate
3. Inflation rate and real interest rate.
4. Valuation of short-term debt securities (treasury bills and other debt instruments).
5. Valuation of long-term debt securities.
6. Arithmetic, geometric, and logarithmic rates of return.
7. Construction of an investment portfolio introduction to Modern Portfolio Theory.
8. Models of annuities paid in arrears and in advance + perpetuity (Part 1).
9. Models of annuities paid in arrears and in advance + perpetuity (Part 2).
10. Models of equal instalments with compounding more frequent or less frequent than the payment periods.
11. Debt repayment, credit assessment indicators, and repayment schedules.
12. Basics of investment profitability analysis (IRR and NPV measures).
13. Use of spreadsheets in financial mathematics and/or the FinCal package in R.
14. Introduction to the valuation of derivatives using the example of an option contract.

Course content – exercises

1. Time value of money in the context of simple interest and compound interest.
2. Equivalent, effective, and average interest rates vs. the discount rate
3. Inflation rate and real interest rate.
4. Valuation of short-term debt securities (treasury bills and other debt instruments).
5. Valuation of long-term debt securities.
6. Arithmetic, geometric, and logarithmic rates of return.
7. Construction of an investment portfolio introduction to Modern Portfolio Theory.
8. Models of annuities paid in arrears and in advance + perpetuity (Part 1).
9. Models of annuities paid in arrears and in advance + perpetuity (Part 2).
10. Models of equal instalments with compounding more frequent or less frequent than the payment periods.
11. Debt repayment, credit assessment indicators, and repayment schedules.
12. Basics of investment profitability analysis (IRR and NPV measures).
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14. Introduction to the valuation of derivatives using the example of an option contract.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written quizzes/tests assessing the ability to analyse and solve problems.	60.0%	80.0%
Assessment of additional assignments requiring the application of methods discussed during the classes.	0.0%	10.0%
A written problem-based test assessing the understanding of concepts and methods.	60.0%	10.0%

Recommended reading

Basic literature

1. Podgórska, M., Klimkowska, J. (2022). Matematyka finansowa. Warszawa: Wydawnictwo Naukowe PWN.
2. Redo, M., Prewysz-Kwinto, P. (2021). Matematyka finansowa. Warszawa: Wydawnictwo Naukowe PWN.

Supplementary literature

1. Borowski, J., Golański, R., Kasprzyk, K., Melon, L., Pogórska, M. (2003). Matematyka finansowa: przykłady, zadania, testy, rozwiązania. Wałbrzych: Szkoła Główna Handlowa.
2. Cegłowski, B., Podgórski, B. (2021). Finanse z arkuszem kalkulacyjnym. Warszawa: Wydawnictwo Naukowe PWN.
3. Sobczyk, M. (2011). Matematyka finansowa: podstawy teoretyczne, przykłady, zadania. Warszawa: Agencja Wydawnicza Placet.
4. Kellison, S. G. (2008). Theory of interest. New York: McGraw-Hill.
5. Piasecki, K., Ronka-Chmielowiec W. (2011). Matematyka finansowa. Warszawa: C.H. Beck.

eResources addresses

Example issues/ example questions/ tasks being completed

Calculating the future value of deposits, loan instalments, and the expected amount of a pension.

Practical activites within the subject

Not applicable

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