COURSE UNIT DESCRIPTION

Course unit title	Course unit code
Mathematics for finance and investment	

Lecturer(s)	Department where the course unit is delivered
Coordinator: Gintautas Bareikis **Other lecturers:**	Department of Computer Science II Faculty of Mathematics and Informatics Vilnius University

Cycle	Type of the course unit
The first	Optional

Mode of delivery	Semester or period when the course unit is delivered	Language of instruction
Face-to-Face	Spring semester	English

Prerequisites
Basics of mathematics

Number of ECTS credits allocated	Student's workload	Contact hours	Individual work
5	146	64	82

Purpose of the course unit: programme competences to be developed		
Financial mathematics equips students with the knowledge of mathematical methods and models used to simulate real-world and artificial problems. Through this discipline, students learn to apply theoretical models and mathematical methods to simulate financial situations, gaining practical skills in utilizing mathematical techniques for financial activities		
Learning outcomes of the course unit	**Teaching and learning methods**	**Assessment methods**
Will be able to apply the concept of percentage in solving mathematical and commercial problems.	Lectures, auditorials, solution and analysis of exercises, consultations,	
Will undestand concepts of simple and compound interests for the amounting and discounting, solving equation of values and utilize these mathematical concepts and methods estimate and optimize cash flows.	Lectures, auditorials, solution and analysis of exercises, consultations,	Examination of answer to the theoretical questions, checking answers and solutions to the given problems,
Will understand the concepts of both simple and complex annuities and be capable of applying these concepts to simulate real-life situations. Will be able to analyze loan amortization and sinking fund schedules. sinking funds shedules.	Lectures, auditorials, solution and analysis of exercises, consultations.	Examination of answer to the theoretical questions, checking answers and solutions to the given problems,
Will comprehend the concepts of promissory notes and bonds, including the evaluation of bond rates of return. Will possess the ability to estimate the value of fixed-income securities portfolios.	Lectures, auditorials, solution and analysis of exercises, consultations, demonstration fractals models and properties using computer programs,	Examination of answer to the theoretical questions, checking answers and solutions to the given problems,
Will understand the concept of cash flow and apply the net present value method to compare investment projects. Will be able to determine the internal rate of return (IRR) and modified internal rate of return (MIRR) of investment projects, will possess the skills to capitalize property and costs, as well as manage depreciation and depletion of assets,	Lectures, auditorials, solution and analysis of exercises, consultations.	Examination of answer to the theoretical questions, checking answers and solutions to the given problems,
Will grasp the concepts related to stocks and be capable of estimating stock values, including market	Lectures, auditorials, solution and analysis of	Examination of answer to the theoretical questions, checking

capitalization rate, expected rate, and rate of return, along with determining the cost of new common stocks. Additionally, will apply the Capital Asset Pricing Model (CAPM).	exercises, consultations.	answers and solutions to the given problems.
Will understand concepts and models of technical analysis . Be abble to apply these models in practice using investment platform.	Lectures, laboratory work, consultations.	Examination of answer to the theoretical questions, testing skills with the investment platform.

Course content: breakdown of the topics	Lectures	Tutorials	Seminars	Laboratory work	Internship/work placement	Contact hours	Individual work	Assignments
								Individual work: time and assignments
1. Percents and their application in commerce.	4		3			7	**6**	Compulsory homework assignments. (7-10 p. MJA)
2. Simple and compound interest. Value equations. Equivalent interest rates.	4		3			7	**10**	Compulsory homework assignments. (67-110p. MJA)
3. Simple and complex annuity. Loan ammortization. Sinking funds.	5		4			9	**12**	Compulsory practical and theoretical homework assignments. (111-189p. chapter MJA)
1. Colloquium								Colloquium assignement
4. Sequrities of the fixed incomes. Discounting of the promissory notes. Bond value evaluation. Yield rate. Portfolio value evaluation.	5		5			10	**12**	Compulsory homework assignments. . (311-330p., 411-425p. MJA)
5. Cash flow of the investment projects. Net present value. Internal rate of return. Finding of the IRR.Depreciation, depletion and capitalization of the asset.	4		5			9	**10**	Compulsory practical and theoretical homework assignments. (207-239p. MJA)
6. Buying and selling stocks. Common stock valuation methods. Cost of preferred stoc.k Cost of capital and ratio analysis. Measuring return risk. The capital asset pricing model.	4		6			10	**12**	Compulsory practical and theoretical homework assignments. (297 - 311p., 357-377p. MJA)
7. Technical analysis in practice.	4			8		12	**20**	Practice assignement.
2. Colloquium								Colloquium assessment.
Total	**30**		**26**	**8**		**64**	**82**	

Assessment strategy	Weight %	Deadline	Assessment criteria
Homeworks	15	During semester	Checking homework by quizzes.
Practice	15	End of semester	Accurate answers to both theoretical and practical tasks are accepted. Points are awarded for presentation.

	35	The first part of the semester	The test evaluates both theoretical and practical questions, with points assigned accordingly. The minimum points required to meet the examiners' criteria are specified. Partially correct answers receive partial credit.
1. colloquium			
2. colloquium	35	At the end of the semester	The test evaluates both theoretical and practical questions, with points assigned accordingly. The minimum points required to meet the examiners' criteria are specified. Partially correct answers receive partial credit

Author	Publishing year	Title	Issue No or volume	Publishing house or Internet site
Required reading				
M.J. Alhabeeb (Referred to as MJA)	2012	Mathematical finance		Wiley
Optional reading				
Peter Zima, Robert L. Brown	2011	Mathematics of finance		Mc Graw Hill