Subject code	ECTS credits
MAT4013	6

Course title in Lithuanian

FINANSINIAI SKAIČIAVIMAI

Course title in English

FINANCIAL CALCULUS

Short course annotation in Lithuanian (up to 500 characters)

Pateikiami palūkanų skaičiavimo metodai, vertybinių popierių įkainojimo modeliai, akcijų portfelio optimizavimo algoritmai bei išvestinių finansinių priemonių analizės metodai. Gebama parinkti tinkamus matematinius metodus ir juos taikyti realių problemų sprendimui. Išmokstama taikyti algoritmus sprendžiant praktinius uždavinius. Gebama interpretuoti gautus matematinio modelio tyrimo rezultatus.

Short course annotation in English (up to 500 characters)

The students are taught to understand the dynamic properties of financial markets, to describe and analyze them mathematically and implement in practice, to apply the general methodology of creating models in deterministic and stochastic environment of security markets, to calculate simple and compound interest, to construct and solve equations of value, to valuate bonds and other securities, to perform mean - variance analysis of securities portfolio and valuation of options.

Prerequisites for entering the course

Mathematical Analysis, Algebra, Probability Theory, Mathematical Statistics

Course aim

To provide an introduction to investment mathematics. To introduce to the basic principles of creation models of financial markets. To develop understanding of the financial processes affecting everyday life and how to manage it.

Links between course outcomes, criteria of learning achievement evaluation, study methods and methods of learning achievement assessment

No	Course outcomes	Criteria of learning achievement evaluation	Study methods	Methods of learning achievement assessment
1	Knowledge and understanding of mathematical theory of interest and application of cash flows. Ability to create optimal investment portfolios.	Student has integrated knowledge of mathematical theory of interest and application of cash flows. Demonstrate the ability of creation optimal investment portfolios.	Assignments, Lecture	Colloquium, Examination
2	Knowledge and understanding of cash flows and investment in securities using probabilistic models.	Demonstrate the ability to describe cash flows by deterministic models and investment in securities using probabilistic models.	Assignments, Lecture	Colloquium, Examination
3	Knowledge and understanding of financial markets.	Demonstrate the ability to describe financial markets by mathematical models.	Assignments, Lecture	Colloquium, Examination, Individual work
4	Knowledge and understanding of relationships in financial markets.	Demonstrate the ability to apply deterministic and stochastic models to the description of relationships in financial markets.	Discussion, Library / information retrieval tasks	Examination, Individual work

5	Knowledge and understanding of financial assets and stochastic models of portfolios and options.	Have ability to analyse financial assets using historical prices and create stochastic models of portfolios and options	Assignments, Individual project	Colloquium, Examination, Individual work
6	Present report of performed study	Ability to estimate information presented in lectures, to take part in discussions creating mathematical models of financial markets.	Discussion, Lecture	Examination, Individual work

Links between study programme outcomes and course outcomes

Study programme outcomes	Running number of course outcome					
	1	**2**	**3**	**4**	**5**	**6**
Comprehend and be able to apply probabilistic and statistical methods for data analysis	+	+	+	+	+	
Summarize and evaluate critically scientific and professional literature, as well as use various tools for collecting of information for the study process and for solving fixed practical/theoretical problems	+				+	+
Identify the problem, collect and analyze real/theoretical data using various mathematical methods, tools and IT technologies	+	+	+	+	+	
Having good foundations of mathematics, logically and critically recognize and describe relations between quantities of real life and mathematical concepts	+			+	+	+
Think logically and analytically, evaluate alternative ways of task solving and implement optimal solutions	+				+	+
Work individually and/or in groups by developing and adopting appropriate mathematical models and tools for use in case analysis					+	+
Demonstrate awareness of economic, legal, social, ethical and environmental context in mathematical projects	+	+	+	+	+	+

Content

No	Content (topics)
1.	Methods of interest calculation
2.	Mathematical methods of cash flow stream
3.	Annuities and application
4.	Mathematics of fixed income securities
5.	Financial markets and instruments
6.	Mathematical theory of portfolio
7.	Mathematical theory of options and trading strategies
8.	Portfolio management

Distribution of workload for students (contact and independent work hours)

Lectures	45 hours
Practical work	**30 hours**
Individual students work	**85 hours**
Total:	**160**

Structure of cumulative score and value of its constituent parts

Colloquium - 25 %, Individual project - 20%, Exam – 50%.

Recommended reference materials

No	Publication year	Authors of publication and title	Publishing house	Number of copies in		
				University library	*Self study rooms*	*Other libraries*
Basic materials						

1	2010	P.Katauskis. Finansų matematika	Vilnius: LBDFI	3	1	
2	2011	E. Valakevičius. Investavimas finansų rinkose	Kaunas „Techno logija"	2		8
Supplementary materials
3	2003	A.T. Adams, P.M. Booth, D.C. Bowie, D.S Freeth. Investment mathematics	Wiley Finance			

Course programme designed by

Prof. dr. Eimutis Valakevičius