



COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Business Mathematics	2024-09-16

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: dr. Vaiva Petrylė Other(s):	Department of Economics and Business Administration, Saulėtekio al. 9 (II), Vilnius

Study cycle	Type of the course unit (module)
First	Compulsory

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Face-to face / on-line	Autumn	English

Requirements for students	
Prerequisites: School level mathematics	Additional requirements (if any): Any basic economics course

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	130	48	82

Purpose of the course unit (module): programme competences to be developed		
The objective of the course is to introduce students to the key concepts and techniques of calculus and matrix algebra and to develop their skills to apply the knowledge of mathematics for the analysis of various business and economic problems.		
Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
Mastering of the main concepts and techniques of matrix algebra and calculus	Lectures, problem teaching, reading of academic literature, solution of simulated cases, critical analysis and interpretation of results.	Homework assignments, individual work, mid-term test, exam.
Comprehension of the significance and essence of application of the learned techniques of matrix algebra and calculus to economic analysis, business planning and decision making	Lectures, problem teaching, reading of academic literature, solution of simulated cases, critical analysis and interpretation of results.	Homework assignments, individual work, mid-term test, exam.
Acquiring skills to conduct operations with matrices and sets, to identify the analytic expression of the linear function, to find derivatives of functions with single and several variables, to perform unconstrained and constrained optimisation of functions;	Lectures, problem teaching, reading of academic literature, solution of simulated cases, critical analysis and interpretation of results.	Homework assignments, individual work, mid-term test, exam.
Ability to convert the unstructured simulated real-world situation into numerical problem and to employ relevant mathematical methods for its analysis and decision making, as well as ability to translate the results of mathematical	Lectures, problem teaching, reading of academic literature, solution of simulated cases, critical analysis and interpretation of results.	Homework assignments, individual work, mid-term test, exam.

analysis and computations into decision recommendations.		
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Content: breakdown of the topics	Contact hours							Self-study work: time and assignments	
	Lectures	Tutorials	Seminars	Exercises	Laboratory work	Internship/work	Contact hours	Self-study hours	Assignments
Introduction to the theory of logic and sets, and its applications.	1			1			2	4	Individual analysis of the simulated economic and business problems, presentation of the solutions, reading of academic literature, mid-term test, exam.
Linear equations. The systems of linear equations and the methods of solving them.	2			1			3	5	
Vectors. Operations with vectors.	1			1			2	3	
Matrices. Basic concepts, definitions and operations with matrixes (transposition, addition, subtraction, scalar multiplication and multiplication with vectors, multiplication of matrices).	2			1			3	5	
Determinant. Inverse matrix. Cramer’s rule. Application of matrix algebra to the economic and business problems: equilibrium models.	6			2			5	9	
Leontyev’s “input-output” model.	2			1			3	5	
Introduction to mathematical functions. Linear functions. Determination of the linear function. “Break-even” analysis.	3			1			4	7	
Examining functions: limits, continuity, extremes and critical points. Differential calculus: derivatives, rules of differentiation, higher-order derivatives.	2			1			4	4	
Unconstrained optimization of functions with one independent variable. Application to the problems of economic and business.	2			1			4	9	
Functions with several independent variables. Partial derivatives. Unconstrained optimization of functions with several independent variables.	3			2			6	12	
Constrained optimization. The method of Lagrangian multipliers	4			2			6	10	
Introduction to integration and its applications in economics	2			1			3	4	
Introduction to financial mathematics	2			1			3	4	
Total	32			16			48	82	

Assessment strategy	Weight, %	Deadline	Assessment criteria
Homework assignments	15	During the session	Correct solving of homework task(s) and presenting them for the audience (at least once).
Mid-term (written, closed book)	40	In the middle of the session	Ability to „diagnose” economic or business decision problem and converse it into the relevant mathematical form, to perform mathematical computations and interpret obtained results. The mid-term will cover the topics covered until the mid-term. Students who, for any reason, have not written the mid-term, will not be able to (re)write it afterwards.
Final exam (written, closed book)	45	At the end of the session	Ability to „diagnose” economic or business decision problem and converse it into the relevant mathematical form, to perform mathematical computations and interpret obtained results. The exam will cover all the topics of the course (since the first until the last lecture).

			<p>The student will be graded positively if the overall assessment, comprised of the homework assignments, the mid-term test and the exam is not less than 50 %.</p> <p>Grading scale:</p> <p>95-100 %, or excellent, 10; 85-94,99 %, or very good, 9; 75-84,99 %, or good, 8; 65-74,99 %, or fair, 7; 55-64,99 %, or satisfactory, 6; 50-54,99 %, or poor, 5. Less than 50 % or unsatisfactory: 4, 3, 2, 1.</p> <p>Taking the exam via “extern” is not possible.</p>
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Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
Compulsory reading				
Jacques, I.	2018	Mathematics for Economics and Business	9th ed.	Pearson
Optional reading				
Taylor, R., Hawkins, S.	2008	Mathematics for Economics and Business		McGraw-Hill Higher Education
Barnett, R.A., Ziegler M.R., Byleen K.E.	2014	College Mathematics for Business, Economics, Life Sciences and Social Sciences		Pearson Education International
Sydsaeter K., Hammond P.	2006	Essential mathematics for economic analysis		Prentice Hall
Bradley, T. and Patton, P.	2002	Essential Mathematics for Economics and Business	2nd ed.	John Wiley and Sons Ltd.