

Subject card

Subject name and code	Mathematical Economics, PG_00171334						
Field of study	Economics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study		
Mode of study	part-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Department of Microeconomics -> Faculty of Economics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Anna Blajer-Gołębiewska				
	Teachers		dr hab. Anna Blajer-Gołębiewska				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	14.0	0.0	0.0	0.0	0.0	14
	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	14		9.0		27.0	50
Subject objectives	The aim of the course is to familiarize the student with the basics of modeling economic processes and phenomena using mathematical methods.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[EKONMU2_W01] has an in-depth knowledge of the nature of social sciences and their place in the system of sciences; understands the differences between contemporary trends in economic thought; knows the claims of contemporary economic theories	A student has in-depth knowledge of the nature of economics, its connections with mathematics and the possibilities of using mathematics to model economic phenomena.	[SW4] test/exam - oral or written
	[EKONMU2_K01] recognises the importance of knowledge in the field of economics in the process of identifying and solving economic problems and of consulting experts when having difficulties in solving them independently	A student recognizes the importance of knowledge in the field of mathematical economics in the process of identifying and solving economic problems.	[SK4] test/exam - oral or written
	[EKONMU2_U08] can independently analyse economic and social phenomena and processes, and can perform a theoretically deepened assessment of such phenomena, using appropriately selected research method	A student is able to independently analyze economic phenomena and processes, has the ability to theoretically in-depth assessment of these phenomena, using an appropriately selected research method in the field of mathematical economics.	[SU4] test/exam - oral or written
	[EKONMU2_K02] is aware of the level of his/her knowledge in the field of economics; understands the need to extend and update this knowledge throughout his/her life	A student is aware of the level of his knowledge in the area of mathematical economics and understands the need to deepen and update this knowledge throughout his life. This awareness deepens during consultations, during which the student identifies areas that require improvement, and participation in the consultations is an expression of his/her active attitude towards the process of learning and improving competences.	[SK1] oral statement/conversation/discussion [SK4] test/exam - oral or written
	[EKONMU2_U01] can creatively interpret and explain economic and social phenomena and relations between them, using acquired knowledge of economics, finance and management sciences	A student is able to interpret and explain economic phenomena and the relationships between these phenomena, using his knowledge of mathematical economics.	[SU4] test/exam - oral or written
	[EKONMU2_U04] can forecast and model complex economic and social processes using quantitative and qualitative methods and tools developed by economic sciences (including statistics and econometrics)	The student is able to model complex economic processes using quantitative methods and tools created by mathematical economics.	[SU4] test/exam - oral or written
	[EKONMU2_U02] can use acquired knowledge to describe and analyse the causes and course of economic and social processes and phenomena, and can formulate his/her own opinions and critically select data and analysis methods based on the achievements of economic and social sciences	A student is able to use the knowledge of mathematical economics to mathematically describe and analyze the course of economic processes and phenomena and is able to critically select data and analysis methods.	[SU4] test/exam - oral or written

Subject contents	1. Mathematical theory of demandIssues: economic model, optimization of consumer choice, optimization of intertemporal consumer choice, Lagrange function, Lagrange multiplier.2. Modeling choice in conditions of risk and uncertaintyIssues: modeling of consumer choices in conditions of risk, criteria for assessing manufacturer's choice variants in conditions of risk and uncertainty.3. Mathematical game theory as a decision-making toolIssues: simultaneous and sequential games, dominant and dominated strategies, Nash equilibrium, Pareto equilibrium.4. Partial and general balancelIssues: market equilibrium in the Walrasian, Neumannian and neoclassical concept of equilibrium, Edgeworth box, Arrow-Hurwicz model, equilibrium in a dynamic approach.5. Mathematical theory of productionIssues: properties of the production function, cost minimization for a given production volume.6. Economic growthIssues: models of exogenous and endogenous economic growth, rules for the accumulation of growth factors in mathematical terms, Solow model. In order to deepen the concepts discussed during lectures, students have the opportunity to participate in consultations		
Prerequisites and co-requisites	Skills to apply knowledge acquired during higher education in mathematics, macroeconomics and microeconomics to solve economic problems.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exam	51.0%	100.0%
Recommended reading	Basic literature	1. Alpha C. Chiang, Kevin Wainwright, Fundamental Methods of Mathematical Economics, McGraw-Hill Higher Education, 4th Edition, 2005. 2. Eric Rasmusen, Games and Information: an Introduction to Game Theory, Wiley-Blackwell, 2007.	
	Supplementary literature	1. R. M. Solow, A Contribution to the Theory of Economic Growth, The Quarterly Journal of Economics, Volume 70, Issue 1, 1956, pp. 65-94. 2. E. T. Dowling, Introduction to Mathematical Economics, McGraw-Hill, Schaums Outline Series, 2001. Martin Osborne, An Introduction to Game Theory, Oxford University Press, 2009. 3. A. Blajer-Gołębiewska, Derivatives - exercises [in:] Mathematical applications in economics and management, ed. E. Babula, L. Czerwonka, University of Gdansk Publishing House, Gdańsk, 2015, pp. 174-186. 4. A. Blajer-Gołębiewska, Integrals - exercises [in:] Mathematical applications in economics and management, ed. E. Babula L. Czerwonka, University of Gdansk Publishing House, Gdańsk, 2015, p. 211-218. 5. A. Blajer-Gołębiewska, Individual corporate reputation and perception of collective corporate reputation regarding stock market investments, PLoS ONE, vol. 16, no. 9, s. 1-21, https://doi.org/10.1371/journal.pone.0257323	
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Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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