Course title	Mathematical Economics	ECTS code	14.3.EE.KZ.3539
		ECTS credits	3

Name of unit administrating study	KMikr	Field of study	Economics	Field of specialisation	L&M;

Teaching staff	Anna Blajer-Gołębiewska, Associate Professor

Number of hours												
Lectures	15	Classes	15	Tutorials	0	Laboratory	0	Seminars	0	Language classes	0

Forma aktywności		Year&Type of studies*	2 SS2,
Hours with the participation of the academic teacher (including office hours, exams, others):		Semester:	3,
Hours without the participation of the academic teacher (student's self-study, homeworks):		Type of course:	obligatory
Total number of hours:	0	Language of instruction:	English

Teaching form	in-class learning
Teaching methods	Lectures including multimodal presentations, Activating methods in training classes,

Prerequisites (required courses and introductory requirements)

Required courses	Microeconomics, Macroeconomics, Mathematical applications in economics and management
Introductory requirements	Knowledge: a student is able to define a given economic problem and explain the dependencies occurring in basic economic models. Skills: a student recognizes the causes and consequences of economic phenomena, interprets economic phenomena. Competences: a student works creatively formulating relationships between economic phenomena.

Assessment method, forms and criteria

Assessment method	Exam
Assessment criteria	Classes: the grade depends on the points obtained in the final test. Passing classes entitles students to take the exam. The exam: the grade depends on the number of points obtained in the exam. The grading scale is consistent with study regulations.

Course objectives

The aim of the course is to familiarize a student with the basics of modelling economic processes and phenomena with the use of mathematical methods.

Learning outcomes

Knowledge	E2_W01	A student has an in-depth knowledge of the nature of mathematical economics and its place in the system of sciences; knows the claims of contemporary economic theories based on mathematical aproach.
	E2_W04	A student knows different types of economic and social ties and regularities governing them in the frames of game theory; has an in-depth knowledge of economic ties between market players.
	E2_W06	A student knows mathematical and statistical methods and tools for description and macro- and microeconomic modelling of economic structures and processes occurring in them

Verification of learning outcomes - Knowledge

Outcomes	written exam	oral exam	test	essay/paper /portfolio	tasks/ homeworks	individual presentation	group presentation	classroom activities	classroom discussion	individual project	group project
E2_W01	X		X								

E2_W04	X		X								
E2_W06	X		X								

Skills	E2_U01	A student can creatively interpret and explain economic and social phenomena and relations between them, using acquired knowledge of mathematics and economics.
	E2_U02	A student can use acquired knowledge in mathematical economics 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 analysis methods based on the achievements of economic and social sciences.
	E2_U04	A student can model economic and social processes using quantitative methods and tools developed by economic sciences, including game theory.
	E2_U08	A student can independently analyse economic and social phenomena and processes, and can perform a theoretically deepened assessment of such phenomena, using appropriately selected mathematical research method.

Verification of learning outcomes - Skills

Outcomes	written exam	oral exam	test	essay/paper /portfolio	tasks/ homeworks	individual presentation	group presentation	classroom activities	classroom discussion	individual project	group project
E2_U01	X		X								
E2_U02	X		X								
E2_U04	X		X								
E2_U08	X		X								

Attitudes	E2_K01	A student recognises the importance of knowledge in the field of economics in the process of identifying and solving economic problems using mathematical approach and of consulting experts when having difficulties in solving them independently.
	E2_K02	A student is aware of the level of his/her knowledge in the field of mathematical economics; understands the need to extend and update this knowledge throughout his/her life.

Verification of learning outcomes - Attitudes

Outcomes	written exam	oral exam	test	essay/paper /portfolio	tasks/ homeworks	individual presentation	group presentation	classroom activities	classroom discussion	individual project	group project
E2_K01	X		X								
E2_K02	X		X								

Course contents

1. Mathematical theory of demand (constrained optimization for the consumer choice)

2. Modeling choice under conditions of risk and uncertainty (risk-avoiders, risk-seekers, utility functions, certainty equivalent, measures of risk, minimax, maximin, Hurwicz rule, Laplace-Bayes rule)

3. Mathematical game theory as a decision-making tool (zero-sum games, saddle point, simultaneous games, Nash equilibrium, Pareto equilibrium, dominant and dominated strategies, sequential games, backward induction)

4. Selected models of partial and general equilibrium (partial vs general equilibrium, Edgeworth box revised, Arrow-Hurwicz model, cobweb model)

5. Mathematical theory of production (properties of the production function, constrained optimization for the production processes)

6. Economic growth (models of exogenous and endogenous economic growth, technological progress in models of economic growth, the Solow model).

Recommended reading lists

Obligatory

- Alpha C. Chiang, Kevin Wainwright, Fundamental Methods of Mathematical Economics, McGraw-Hill Higher Education, 4th Edition, 2005.
- Eric Rasmusen, Games and Information: an Introduction to Game Theory, Wiley-Blackwell, 2007.

Facultative

- Robert M. Solow, A Contribution to the Theory of Economic Growth, The Quarterly Journal of Economics, Volume 70, Issue 1, 1956, pp. 65-94.
- Edward T. Dowling, Introduction to Mathematical Economics, McGraw-Hill, Schaum's Outline Series, 2001.
- Martin Osborne, An Introduction to Game Theory, Oxford University Press, 2009.
- Anna 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.
- Anna 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.
- Anna 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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* SS1- undergraduate studies * SS2 - graduate studies * SDang - doctoral studies
** MSG - International Economic Relations

