

Course title		Mathematical Applications in Economics and Management						ECTS code		14.3.EM.PZ.2	
								ECTS credits		7	
Name of unit administrating study		KMikr		Field of study		MSG**		Field of specialisation		IB;	
Teaching staff		Leszek Czerwonka, Associate Professor ; Elżbieta Babula, Ph.D.									
Number of hours											
Lectures	15	Classes	30	Tutorials	0	Laboratory	0	Seminars	0	Language classes	0
Forma aktywności								Year&Type of studies*		1 SS1,	
Hours with the participation of the academic teacher (including office hours, exams, others):								Semester:		1,	
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, Collaborating, group activities, Lectures and workshops based on the literature and sources in English, Academic speaking									
Prerequisites (required courses and introductory requirements)											
Required courses											
Introductory requirements		Recommended knowledge in mathematics: Functions of One Variable, Functions of Many Variables, Foundations of Differential Calculus, Solving Systems of Linear Equations									
Assessment method, forms and criteria											
Assessment method		Exam									
Assessment criteria		The percentage of points to obtain grades: below 50% - 2.0 51% - 3.0 61% - 3.5 71% - 4.0 81% - 4.5 91% - 5.0.									
Course objectives											
Acquainting students with the introduction to higher mathematics and its applications in economics and management.											
Learning outcomes											
Knowledge		MSG1_W01		A student has fundamental knowledge in the field of economics. A student knows basic economic models, such as the market equilibrium model, the consumer model, the firm theory and the model of national income. A student knows applications of differential equations in models of economic growth.							
		MSG1_W05		A student knows the market models, principles of market functioning and the market mechanism in domestic and international aspect. A student knows basic matrix algebra and the applications of matrices in market models.							
		MSG1_W08		A student knows fundamental methods and tools (including computer tools) which allow to describe and analyze economic entities operating on international market. A student knows how to identify different types of sequences and series, and knows their properties. A student knows the methods supporting decision-making processes, including methods of evaluation investments based on discounting, such as the present and future value. A student has basic knowledge in the field of financial mathematics, related to conducting business activity. A student has knowledge in the area of functions of one and several variables, and knows the elements of differential and integral calculus.							
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
MSG1_W01	X		X								
MSG1_W05	X		X								
MSG1_W08	X		X								
Skills	MSG1_U08	A student uses basic methods and tools (including computer tools) to diagnose business processes and to make right economic decisions. A student applies differential calculus to optimize functions of one- and several variables for firms' decisions and industrial organization problems. A student can determine the basic integrals of elementary functions and apply them to solve problems based on the marginal calculations.									

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
MSG1_U08	X		X								X
Attitudes	MSG1_K01	A student knows the limits of his/her knowledge and skills and understands the need for learning throughout the life. Working independently the student develops his/her memory and analytical skills. A student correctly identifies and resolves dilemmas of own development and learning.									
	MSG1_K02	A student is able to work in a team, take on different team roles carrying out group projects during the course. A student develops abilities of autonomous and reliable performing his duties.									

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
MSG1_K01	X		X								
MSG1_K02	X		X								X

Course contents

1. Subject: Matrices.
Contents: matrix operations, inverse of a matrix, determinant of a matrix, properties of determinants of matrices, application to models of a market and national income
2. Subject: Sequences and series.
Contents: notion of sequence, arithmetic and geometric sequence, convergence of the sequence, convergence criteria, notion of series, general properties of series, application to financial mathematics
3. Subject: Functions.
Contents: elementary functions, inverse functions, monotonicity, composition of functions, functions of many variables, notion of limit, continuity of elementary functions, concavity and convexity
4. Subject: The differential calculus.
Contents: tangent to a curve, arithmetic of derivatives, second derivatives, partial derivatives, optimization, profit maximization, cost minimization with Lagrange multipliers
5. Subject: Integration.
Contents: notion of primitive function, definite and indefinite integrals, formula for the integration by parts, formula for the integration by substitution, applications of integration to financial mathematics
6. Subject: Differential equations.
Contents: first order differential equations, application to growth models

Recommended reading lists

Basic references:

1. E. Babula, L. Czerwonka (ed.), Zastosowanie matematyki w ekonomii i zarządzaniu-Mathematical Applications in Economics



- and Management, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2015
2. T. Bradley, Essential mathematics for economics and business, Wiley, 2013
 3. M. Wisniewski, Mathematics for economics, Palgrave Macmillan, 2013
 4. R.A. Barnett, M.R. Ziegler, K.E. Byleen, College Mathematics for Business, Economics, Life Sciences, and Social Sciences, Pearson Prentice Hall, Upper Saddle River, New Jersey 2008
 5. F. Werner, Y. Sotskov, Mathematics of Economics and Business, Routledge, Abingdon 2006

Facultative references:

1. L. Czerwonka, Mathematical Models of Mergers: Conditions of Application and Conclusions [in:] Market Concentration and Economy, Series of Monographs, Vol. 7, Macro & Microeconomics Case Studies, T. Bernat (ed.), Publishing House Volumina.pl Daniel Krzanowski, Szczecin 2010, pp. 206-219

Contact

leszek.czerwonka@ug.edu.pl, elzbieta.babula@ug.edu.pl,

* SS1- undergraduate studies * SS2 - graduate studies * SDang - doctoral studies
** MSG - International Economic Relations