COURSE SPECIFICATION

Course code	full-time studies	**Z-ZB-E-103**
	part-time studies	**-**
Course title in English	**Mathematics**	
Course title in Polish	**Matematyka**	
Valid from academic year	**2025/2026**	

PLACEMENT IN THE TEACHING PROGRAM

Programme of study	**BUSINESS MANAGAMENT**
Level of education	**1st degree**
Studies profile	**academic**
Form and mode of study	**full-time programme**
Scope	**all**
Academic unit responsible for the course	**Department of Mathematics and Physics**
Course coordinator	**dr Leszek Hożejowski**
Approved by	**dr hab. inż. Dariusz Bojczuk, prof. uczelni**

GENERAL CHARACTERISTIC OF THE COURSE

Teaching block		**Subject of general education**
Course status		**Obligatory**
Language of instruction		**English**
Semester of delivery	full-time studies	**Semester I**
	part-time-studies	**-**
Prerequisites		**Knowledge and skills in mathematics at secondary school level**
Exam (YES/NO)		**YES**
ECTS		**6**

Method of conducting classes		**lecture**	**classes**	**laboratory**	**project**	**other**
Number of hours per semester	full-time	**30**	**45**			
	part-time					

LEARNING OUTCOMES

Category	Outcome code	Course learning outcomes	Reference to the directional learning effect
Knowledge	W01	The student knows the concepts of differential and integral calculus with respect to functions of one and several variables.	ZB1_W06
	W02	A student knows the appropriate tools of calculus which allow to examine functions of one variable and calculate indefinite and definite integrals.	ZB1_W06
	W03	A student has knowledge of complex numbers, matrix calculus, and methods of solving systems of linear equations.	ZB1_W06
	W04	A student understands the abstract and formal language of mathematics.	ZB1_W06
Skills	U01	A student can perform calculations in typical problems of calculus (evaluating limits, differentiation, examining functions, integration, etc.) and linear algebra (complex numbers, matrix calculus, systems of linear equations).	ZB1_U01
	U02	A student can apply mathematical calculus and algebraic to model and solve problems related to socio-economic phenomena. He knows how to interpret the obtained results.	ZB1_U01
Social competences	K01	A student sees the need and opportunity to acquire mathematical knowledge indispensable for solving encountered real-life problems.	ZB1_K01
	K02	A student is open to broaden his mathematical knowledge and skills for mathematical modelling and analyzing real-life phenomena.	ZB1_K02

COURSE CONTENT

Method of conducting classes	Course content
lecture	Matrices and matrix operations. Determinant of a matrix. Inverse matrix. Solving matrix equations. Systems of linear equations. Cramer's Rule. Solving systems of linear equations. Complex numbers, operations on complex numbers and solving polynomial equations in the complex domain. Functions of one variable and their properties. Composite functions. Inverse functions. Limit and continuity of a function. Derivative of a function and its applications (marginal values, elasticity). Taylor's formula. Extremum and monotonicity of a function. Convexity of a function. Indefinite and definite integral and its applications. Functions of several variables, partial derivatives and their applications.
classes	Operations on matrices and calculating determinants. Inverting matrices. Solving matrix equations. Solving systems of linear equations. Operations on complex numbers and solving polynomial equations in the complex domain. Determining the domain of a function; drawing graphs of basic functions. Evaluating the limits of a function. Calculating the derivative of a function; marginal values and elasticity. Taylor's formula. Determining local extrema, intervals of monotonicity and convexity of a function. Computing indefinite and definite integrals and applications of integrals. Functions of several variables, partial derivatives and their applications.

METHODS FOR VERIFYING LEARNING OUTCOMES

Outcome code	Learning outcomes verification methods					
	Oral examination	Written examination	Test	Project	Report	Other
W01		X	X			
W02		X	X			
W03		X	X			
W04		X	X			
U01		X	X			
U02		X	X			
K01						X
K02						X

FORM AND CONDITIONS OF ASSESSMENT

Form of classes	Assessment type	Assessment Criteria
lecture	Examination	The written exam scores at least 50%.
classes	Credit with grade	The written tests scores at least 50%.

STUDENT WORKLOAD

ECTS Balance								
No.	Activity type	Student workload					Unit
		full-time					
1.	Scheduled contact hours	W	C	L	P	S	h
		30	45				
2.	Other (consultations, exams)	4	2				h
3.	**Total number of contact hours**	**81**					h
4.	**Number of ECTS credits for contact hours**	**3,2**					ECTS
5.	**Number of hours of independent student work**	**69**					h
6.	**Number of ECTS points that a student obtains through independent work**	**2,8**					ECTS
7.	**Workload related to practical classes**	**90**					h
8.	**Number of ECTS credit points which a student receives for practical classes**	**3,6**					ECTS
9.	**Total number of hours of a student's work**	**150**					
10.	**ECTS credits for the course** *1 1 ECTS credit =25 student learning hours*	**6**					ECTS

W - LECTURE C – CLASSES L – LABORATORY P- PROJECT S – SEMINAR

READING LIST

1. Stewart J. (2016), *Calculus,*Brooks/Cole Cengage Learning
2. Weir M.D, Hass J.R., Heil Ch.E., (2014), *Thomas' Calculus: Early Transcendentals*, Pearson
3. Selinger P. (2021), *Matrix Theory and Linear Algebra. (an open text*: https://www.coursehero.com/file/95696375/LinearAlgebra-2021pdf/)