

## ITEM CARD (SYLLABUS)

### Description of the course

Code course	Course name	<i>MATHEMATICS</i>		
<i>IBF/O/I/S/A.1</i>		<i>MATEMATYKA</i>		
Language	English			
Academic Year	<i>2024/2025</i>			
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Direction of study	<i>International Business and Finance</i>			
Level of education (study)	<i>Level 1</i>			
Profile of education (study)	<i>General academic</i>			
Form of study	<i>Stationary</i>			
Semester / semesters	<i>1</i>			
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Belonging to a course groups	<i>A-Fundamental courses</i>			
Course status	<i>Compulsory</i>			
Form of classes, hours, ECTS points	Form of classes	Number of hours	Number of ECTS points	
	Lecture	30 [h]	6 ECTS	
	Exercises	45 [h]		
	Seminar	[h]		
Relationship of subject	with profile of education (study)	<i>Related to conducted scientific activity in the field of economics and finance</i>		3 ECTS
	with qualifications	-----		ECTS
	with discipline	Economics and finance		6 ECTS
Form of teaching	<i>traditional - classes organized at the University</i>			
The criterion for the selection of students	All students of International Business and Finance			
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Unit running course	Department of International Business and Finance			

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## COURSE OUTCOMES, METHODS OF TEACHING AND VERIFICATION OF THE EFFECTS OF EDUCATION

Purpose of the course:	The aim of the course is to familiarize students with the issues of differential and integral calculus of functions one and two variables and linear algebra.
Course teaching content:	<p>The course content is related to conducted scientific research.</p> <p><b>Lecture content:</b></p> <ol style="list-style-type: none"> <li>1. Basics of mathematical logic. (2h, W2)</li> <li>2. Functions and their properties. (2h, W1)</li> <li>3. Number sequences and their limits. (2h, W1)</li> <li>4. Limits and continuity of functions. (2h, W1)</li> <li>5. Calculation of derivatives of one variable function, extremums and intervals of monotonicity, inflection points and intervals of concavity and convexity of a function, asymptotes, curve sketching. (8h, W1, BN)</li> <li>6. Integral calculus of one variable function – the indefinite integral and its properties, main integration methods; the definite integral, properties and application. (6h, W1)</li> <li>7. Differential calculus of two variable function – partial derivatives, extreme values. (2h, W1, BN)</li> <li>8. Matrices and determinants, properties, actions on matrices, inverse matrix, rank of a matrix. (5h, W2, BN)</li> <li>9. Systems of linear equations. (3h, W2)</li> </ol> <p><b>Exercises content:</b></p> <ol style="list-style-type: none"> <li>1. Basics of mathematical logic. (1h, K1)</li> <li>2. Review of functions, checking the properties of functions. (2h, U1)</li> <li>3. Calculating limits of sequences and limits of functions, checking continuity of functions. (4h, U1, U2)</li> <li>4. Differential calculus of one variable function – calculation of derivatives and differentials of the first and higher order, extreme values, monotonicity, concavity of a function, inflection points, asymptotes, drawing the graph of a function. (8h, U1, U2, K1, BN)</li> <li>5. Calculation of indefinite integrals – main rules, substitution, integration by parts, integration of quantifiable functions; use of the definite integrals to calculate the areas between curves. (10h, U1, U2, K1)</li> <li>6. Written test. (2h)</li> <li>7. Calculation of partial derivatives and extreme values of two variables functions. (4h, U1, U2, K1, BN)</li> <li>8. Actions on matrices, calculation of determinants, inversion of a matrix, rank of a matrix, solving matrix equations. (6h, U1, U2, K1, BN)</li> <li>9. Solving systems of linear equations – Cramer formulas,</li> </ol>

	Gaussian elimination method, Kronecker – Capelli theorem. (6h, U1, U2, K1) 10. Written test. (2h)
Method of teaching:	<i>Lecture including multimedia techniques and traditional method. Practical methods (counting exercises, discussion, work in groups).</i>
Grading criteria, criteria for assessing learning outcomes, method of calculating the final grade:	<i>The condition for passing the course is achieving all the required learning outcomes specified for the course.</i>  <i>Lecture – evaluation based on a written exam.</i>  <i>Exercises – the grade is determined by the following: written tests (70%), written control works and activity at classes (30%).</i>

Education effects for the course in relation to the direction effects and form of classes				Verification methods of learning outcomes (form check)	
Number of education effect	Description effects of education for the subject (PEU)  Student who has completed the course (W) knows and understands/(U) is able to /(K) is ready to:	Directional learning effect (KEU)	Form of realization of teaching	Examination form	Form check
W1	Knows and understands to an advanced level selected issues of mathematical analysis, in particular differential calculus of one and two variables functions and integral calculus of one variable functions.	K_W01 K_W04	Lecture	Pass with a grade	Written exam
W2	Knows and understands to an advanced level selected issues of linear algebra and mathematical logic.	K_W04	Lecture	Pass with a grade	Written exam
U1	Is able to use theoretical knowledge of economics and finance to identify and interpret complex and unusual economic and financial phenomena.	K_U01	Exercise	Pass with a grade	Written tests and control works
U2	Can plan and organise work individually and as part of a team, and can plan and implement lifelong learning.	K_U14 K_U15	Exercise	Pass with a grade	Written tests and control works
K1	Is ready to critically evaluate his/her knowledge and to recognise the importance of knowledge in solving cognitive and practical problems.	K_K01	Exercise	Pass with a grade	Activity at classes
Recommended reading, literature supplement, teaching aids					
1) <i>S. Axler, Linear Algebra Done Right, Undergraduate Texts in Mathematics, Springer (available for free download)</i> <a href="https://apuntespme.cl/biblio/AXLER_LINEARALGEBRA.pdf">https://apuntespme.cl/biblio/AXLER_LINEARALGEBRA.pdf</a> 2) <i>S. Calaway, D. Hoffman, D. Lippman, Applied calculus, 1th Edition (available for free download)</i> <a href="https://www.opentextbookstore.com/appcalc/appcalc.pdf">https://www.opentextbookstore.com/appcalc/appcalc.pdf</a> 3) <i>G.Hartman, Calculus 1 (available for free download)</i> 4) <i>G.Hartman, Calculus 2 (available for free download)</i>					

<http://www.apexcalculus.com/downloads>

5) G. Strang, *Linear algebra and its applications* (available for free download)

<http://www.edisciplinas.usp.br>

A detailed list of additional literature, web sources and teaching aids will be provided by a teacher during the first class

Student workload needed to achieve the assumed learning outcomes - balance of ECTS points			
Participation in classes, activities	Student's working hours [h]		
	Other hours. Contact (IGK)	Classes without a teacher – student's own work	Classes
Participation in Lectures/ Seminars	X	X	30 [h]
Participation in Exercises/Laboratories	X	X	45 [h]
Participation in the Consultation	7 [h]	X	X
Preparing to lectures/ exercises/seminars	X	68 [h]	X
Preparation for an examination			
Summary of student's workload	7 [h]/0,3 ECTS	68 [h]/2,7 ECTS	75 [h]/3 ECTS
Points of ECTS for subject	150 [h] / 6 ECTS		

Additional information and remarks
<p>For students with special needs, including those with disabilities and chronic illnesses, the methods and forms of verifying learning outcomes specified above (in the course syllabus) are appropriately adjusted to meet the individual needs of these students.</p> <p>"The detailed rules and rights of students with special needs, including those with disabilities and chronic illnesses, regarding participation, assessment, and examinations, are specified in the Study Regulations, Study Rules, and Procedures for Ensuring Accessibility of the Educational Process for Students with Special Needs, including those with disabilities and chronic illnesses."</p>