Faculty of Economics and Management, University of Bialystok

Stationary Studies International Economic Relations 1st degree

Academic Year 2018/2019

| Course: Mathematics | ECTS Points: 7 |
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| Course Code: 0-300-MS1-1MAT#E | |
| Language: English | |
| Course description: educational content – elective, optional course | |
| Lecturer: Dr Iwona Skrodzka | |
| Semester: **winter**/summer | Number of hours: 45<br>Lecture: 15<br>Classes: 30 |
| <u>Courses to be completed before enrollment to the course:</u><br><br>Knowledge of the mathematics range of secondary school. | |
| <u>Substantive content</u> | |

| Lectures | Number of Hours |
|---|---|
| **Matrices and determinants.** The notion of matrix. Operations on matrices. Elementary operations on matrices. Basic matrix. Matrix determinant and its properties. The notion and properties of inverse matrix. Defining a rank of matrix. | 3 |
| **Systems of linear equations.** System of n equations with n unknowns and Cramer's rules. Homogeneous and nonhomogeneous linear equation systems. Solving linear equation systems with the use of elementary operations. Basic solutions of linear *equation system. Example usage of linear equation systems in social and economic sciences.* | 2 |
| **The notion and basic properties of one variable function.** | 1 |
| **The sequences of real numbers and their limits. The limit and the continuity of one variable function. Vertical and horizontal asymptotes of the one variable function graph.** | 2 |
| **Differential calculus of one variable function.**<br>The concept of the derivative. Derivatives of elementary functions. The rules of differentiation. Higher order derivatives. Geometric and economic interpretation of derivative. Elasticity of function. Examining the monotonicity of function. Extrema of function. Concavity, convexity and infection points of function. Example usage of differential calculus in social and economic sciences. | 3 |
| **Integral calculus of one variable function.** The notion, geometric interpretation and basic properties of Riemann integral. Indefinite integral and its basic properties. Example usage of integral calculus in social and economic sciences. | 2 |
| **Functions of two variables.** The notion of two variables function. Partial derivatives of two variables function. Economic interpretation of first order partial derivatives. Partial elasticities and their economic interpretation. Higher order partial derivatives of two variables function. Two variables function extremum. | 2 |

| Classes: | Number of Hours |
|---|---|
| **Exercises in matrices and determinants.** Operations on matrices. Elementary operations on matrices. Basic matrix. Matrix determinant and its properties. The notion and properties of inverse matrix. Defining a rank of matrix. | 6 |
| **Exercises in systems of linear equations.** System of n equations with n unknowns | 4 |

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| and Cramer's rules. Homogeneous and nonhomogeneous linear equation systems. Solving linear equation systems with the use of elementary operations. Basic solutions of linear equation system. | |
| **Exercises in basic properties of one variable function.** | 2 |
| **Exercises in monotonicity and limits of sequences. Exercises in the limit and the continuity of one variable function.** Vertical and horizontal asymptotes of the one variable function graph. | 4 |
| **Exercises in differential calculus of one variable function.** Derivatives of elementary functions. The rules of differentiation. Higher order derivatives. Geometric and economic interpretation of derivative. Elasticity of function. Examining the monotonicity of function. Extrema of function. Concavity, convexity and infection points of function. Example usage of differential calculus in social and economic sciences. | 6 |
| **Exercises in integral calculus of one variable function.** The notion, geometric interpretation and basic properties of Riemann integral. Indefinite integral and its basic properties. Example usage of integral calculus in social and economic sciences. | 4 |
| **Exercises in functions of two variables.** Partial derivatives of two variables function. Economic interpretation of first order partial derivatives. Partial elasticities and their economic interpretation. Higher order partial derivatives of two variables function. Two variables function extremum. | 4 |

Aim of the course:

The aim of the course is to educate creative and logical thinking, strict expression of ideas, formulate and solve problems in the field of economics by using mathematical tools. Particular attention is paid to the introduction of mathematical methods used in economics and management. The course includes elements of mathematical analysis and linear algebra.

Teaching methods:

Methods of feeding (traditional lecture conducted with the use of multimedia presentations), practical methods and activating (individual work at the blackboard, group work, individual work).

Literature:

M. Anholcer, Mathematics in economics and management : examples and exercises, Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań 2015.
Z. Michna, Mathematics, Publishing House of Wrocław University of Economics, Wrocław 2012.
M. Filipowicz, Mathematics theoretical background and exercises, Wyższa Szkoła Finansów i Zarządzania, Białystok 2005.
M. Hoy, J. Livernois, C. McKenna, R. Rees, T. Stengos, Mathematics for Economics, The MIT Press, Cambridge Massachusetts, London England, 2011.
C. P. Simon, L. Blume, Mathematics for Economists, W. W. Norton & Company, New York, London 1994.

Forms and conditions of credit:

Written examination – test