

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT	
SUBJECT CARD	
Name in English	MATHEMATICAL ANALYSIS I
Name in Polish	ANALIZA MATEMATYCZNA I
Main field of study (if applicable)	
Specialization (if applicable)	
Level and form of studies	I level, full-time
Kind of subject	obligatory
Subject code	MAT001651
Group of courses	NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	30			
Number of hours of total student workload (CNPS)	120	60			
Form of crediting	exam	crediting with grade			
For group of courses mark (X) final course					
Number of ECTS points	4	2			
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	2,4	1,2			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
It is recommended that the knowledge of mathematics is equivalent to high school certificate at the advanced level.

SUBJECT OBJECTIVES
<p>C1. Understanding the basic methods of analysis of the graph of functions of single variable.</p> <p>C2. Understanding the concept of the definite integral and its basic properties and methods of determination.</p> <p>C3. Understanding the practical applications of mathematical methods for the analysis of functions of single variable.</p>

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge student:

PEK_W1. knows the basic definitions and theorems from Mathematical Analysis of functions of single variable

PEK_W2. knows the notion of the derivative and the definite integral and their basic applications

Relating to skills student:

PEK_U1. can examine graphs of simple functions

PEK_U2. can calculate integrals of simple functions

Relating to social competences student:

PEK_K1. understands how calculus affects on the development of technical civilization

PROGRAM CONTENT

Form of classes - lectures		Hours
Lec1	Mathematical notation with quantifiers, elements of set theory, real numbers, subsets of real numbers (intervals, half-lines).	2
Lec2	Basic properties of functions (symmetry, monotonicity, periodicity). Algebra of functions. Transformations of functions (New functions from old functions).	2
Lec3	Composite of functions. The inverse function. Power and exponential functions and their inverses. Properties of logarithms.	2
Lec4	Trigonometric functions and their graphs. Trigonometric identities. Cyclometric functions and their graphs .	2
Lec5	Sequences and limits. Limits Laws. Squeeze theorem.	2
Lec6	Monotonic sequence theorem and the number e. Improper limits.	2
Lec7	The limit of a function at a point. One-sided limits. Limits Laws. Squeeze theorem for functions.	
Lec8	Limits involving infinity. Asymptotes of functions.	2
Lec9	Continuity of a function at a point and on an interval. Basic properties of continuous functions. Intermediate Value theorem and approximate solutions of equations. Points of discontinuity.	2
Lec10	The derivative of a function. Geometrical and physical interpretations of the derivative. Rules of differentiation.	2
Lec11	Indeterminate forms and de L'Hospital's rule. The Mean value theorem. Extreme values. Convexity of a function	2
Lec12	Derivatives and the Shapes of curves.	2
Lec13	The closed interval method. Optimization problems	2
Lec14	Antiderivatives and indefinite integrals. The substitution rule and integration by parts. Integration of rational functions by partial fractions.	2
Lec15	Applications of methods of mathematical analysis of single variable.	2
	Total hours	30
Form of classes - classes		Hours
Cl1	Statements, logic connectives, union, intersection, difference and complement of a set. Cartesian product.	2
Cl2	Natural numbers, integers, rational and real numbers. Absolute value	2

C13	Properties of functions. Transformations of functions	2
C14	Inverse function. Composite functions.	2
C15	Trygonometric functions and trygonometric identities.	2
C16	Trygonometric equations and inequalities. Cyclometric functions	2
C17	Limits of sequences.	2
C18	The limit of a function at a point. Limit laws.	2
C19	Continuous functions. Points of discontinuity. Approximate solutions of equations	2
C110	Derivatives. Rules of differentiation Applications of differentiation	2
C111	Indeterminate forms. De L'Hospital's rule.	2
C112	Derivatives and the Shapes of Curves.	2
C113	The closed interval method and optimization problems	2
C114	Integration – I.	2
C115	Integration – II.	2
	Total hours	30

TEACHING TOOLS USED

- N1. Lecture - traditional method
N2. Classes - traditional method
N3. Student's self work with the assistance of mathematical packages

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F-forming; P - concluding)	Educational effect number	Way of evaluating educational effect achievement
P-C1	PEK_U01, PEK_U02, PEK_K1	quizzes, in class presentations
P-Lec	PEK_W01, PEK_W02	exam

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE

- [1] J. Stewart, Calculus: concepts and contexts, single variable, Brooks/Cole Publishing Company 1998
[2] F. Leja, Rachunek Różniczkowy i Całkowy, Wydawnictwo Naukowe PWN, 2012
[3] W. Kryszicki, L. Włodarski, Analiza Matematyczna w Zadaniach, Cz. I, PWN, Warszawa 2006

SECONDARY LITERATURE:

- [1] K. Kuratowski, Rachunek Różniczkowy i Całkowy. Funkcje Jednej Zmiennej, Wydawnictwo Naukowe PWN, 2012
[2] M. Gewert, Z. Skoczylas, Analiza Matematyczna 1. Przykłady i Zadania, Oficyna Wydawnicza GiS, Wrocław 2011

SUBJECT SUPERVISORS

1. Wydziałowa Komisja Programowa ds. Kursów Ogólnouczelnianych
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MATHEMATICAL ANALYSIS I MAT001651
 AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
 AND SPECIALIZATION

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subject objectives	Programme content	Teaching tool number
PEK_W1		C1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15 C11 C12 C13 C14 C15 C16 C17 C18 C19 C10 C11 C12 C15	N1, N2, N3
PEK_W2		C2 C3	Lec11 Lec12 Lec13 Lec14 Lec15 C13 C14 C15	N1, N2, N3
PEK_U1		C1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec15 C11 C12 C13 C14 C15 C16 C17 C18 C19 C10 C11 C12 C15	N1, N2, N3
PEK_U2		C1 C2 C3	Lec11 Lec12 Lec13 Lec14 Lec15 C13 C14 C15	N1, N2, N3
PEK_K1		C1 C2	Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15 C12 C13 C14 C15	N1, N2, N3