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

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

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 deivative 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 quantifieries, 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	Trygonometric functions and their graphs. Trygonometric 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 conituous 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

Cl3	Properties of functions. Transformations of functions	2
Cl4	Inverse function. Composite functions.	2
Cl5	Trygonometric functions and trygonometric identities.	2
Cl6	Trygonometric equations ind inequalities. Cyclometric functions	2
Cl7	Limits of sequences.	2
Cl8	The limit of a function at a point. Limit laws.	2
Cl9	Continuous functions. Points of discontinuity. Approximate solutions of equations	2
Cl10	Derivatives. Rules of differentiation Applications of differentiation	2
Cl11	Indeterminate forms. De L'Hospital's rule.	2
Cl12	Derivatives and the Shapes of Curves.	2
Cl13	The closed interval method and optimization problems	2
Cl14	Integration – I.	2
Cl15	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-Cl	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. Krysicki, 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
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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 Cl1 Cl2 Cl3 Cl4 Cl5 Cl6 Cl7 Cl8 Cl9 Cl10 Cl11 Cl12 Cl15	N1, N2, N3
PEK_W2		C2 C3	Lec11 Lec12 Lec13 Lec14 Lec15 Cl13 Cl14 Cl15	N1, N2, N3
PEK_U1		C1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec15 Cl1 Cl2 Cl3 Cl4 Cl5 Cl6 Cl7 Cl8 Cl9 Cl10 Cl11 Cl12 Cl15	N1, N2, N3
PEK_U2		C1 C2 C3	Lec11 Lec12 Lec13 Lec14 Lec15 Cl13 Cl14 Cl15	N1, N2, N3
PEK_K1		C1 C2	Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15 Cl12 Cl13 Cl14 Cl15	N1, N2, N3