	FACULTY *****

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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	**MAT001411**
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	90			
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
Wy1	Mathematical notation with quantifieries, elements of set theory, real numbers, subsets of real numbers (intervals, half-lines).	2.0
Wy2	Basic properties of functions (symmetry, monotonicity, periodicity). Algebra of functions. Transformations of functions (New functions from old functions).	2.0
Wy3	Composite of functions. The inverse function. Power and exponential functions and their inverses. Properties of logarithms.	2.0
Wy4	Trygonometric functions and their graphs. Trygonometric identities. Cyclometric functions and their graphs .	2.0
Wy5	Sequences and limits. Limits Laws. Squeeze theorem.	2.0
Wy6	Monotonic sequence theorem and the number e. Improper limits.	2.0
Wy7	The limit of a function at a point. One-sided limits. Limits Laws. Squeeze theorem for functions.	
Wy8	Limits involving infinity. Asymptotes of functions.	2.0
Wy9	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.	2.0
Wy10	The derivative of a function. Geometrical and physical interpretations of the derivative. Rules of differentiation.	2.0
Wy11	Indeterminate forms and de L'Hospital's rule. The Mean value theorem. Extreme values. Convexity of a function	2.0
Wy12	Derivatives and the Shapes of curves.	2.0
Wy13	The closed interval method. Optimization problems	2.0
Wy14	Antiderivatives and indefinite integrals. The substitution rule and integration by parts. Integration of rational functions by partial fractions.	2.0
Wy15	Applications of methods of mathematical analysis of single variable.	2.0
	Total hours	**30**
	Form of classes - classes	Hours
Cw1	Statements, logic connectives, union, intersection, difference and complement of a set. Cartesian product.	2.0
Cw2	Natural numbers, integers, rational and real numbers. Absolute value	2.0
Cw3	Properties of functions. Transformations of functions	2.0
Cw4	Inverse function. Composite functions.	2.0

Cw5	Trygonometric functions and trygonometric identities.	2.0
Cw6	Trygonometric equations ind inequalities. Cyclometric functions	2.0
Cw7	Limits of sequences.	2.0
Cw8	The limit of a function at a point. Limit laws.	2.0
Cw9	Continuous functions. Points of discontinuity. Approximate solutions of equations	2.0
Cw10	Derivatives. Rules of differentiation Applications of differentiation	2.0
Cw11	Indeterminate forms. De L'Hospital's rule.	2.0
Cw12	Derivatives and the Shapes of Curves.	2.0
Cw13	The closed interval method and optimization problems	2.0
Cw14	Integration – I.	2.0
Cw15	Integration – II.	2.0
	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-Cw	PEK_U01, PEK_U02, PEK_K1	quizzes, in class presentations
P-W	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

1. Wydziałowa Komisja Programowa ds. Kursów Ogólnouczelnianych
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

MATHEMATICAL ANALYSIS MAT001411

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	Wy1 Wy2 Wy3 Wy4 Wy5 Wy6 Wy7 Wy8 Wy9 Wy10 Wy11 Wy12 Wy13 Wy14 Wy15 Cw1 Cw2 Cw3 Cw4 Cw5 Cw6 Cw7 Cw8 Cw9 Cw10 Cw11 Cw12 Cw15	N1, N2, N3
PEK_W2		C2 C3	Wy11 Wy12 Wy13 Wy14 Wy15 Cw13 Cw14 Cw15	N1, N2, N3
PEK_U1		C1	Wy1 Wy2 Wy3 Wy4 Wy5 Wy6 Wy7 Wy8 Wy9 Wy10 Wy15 Cw1 Cw2 Cw3 Cw4 Cw5 Cw6 Cw7 Cw8 Cw9 Cw10 Cw11 Cw12 Cw15	N1, N2, N3
PEK_U2		C1 C2 C3	Wy11 Wy12 Wy13 Wy14 Wy15 Cw13 Cw14 Cw15	N1, N2, N3
PEK_K1		C1 C2	Wy9 Wy10 Wy11 Wy12 Wy13 Wy14 Wy15 Cw12 Cw13 Cw14 Cw15	N1, N2, N3