FACULTY OF ELECTRONICS

SUBJECT CARD

Name in English	**MATH-ANALYSIS 1**
Name in Polish	**MATEMATYKA-ANALIZA 1**
Main field of study (if applicable):	**ECE**
Specialization (if applicable):	
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory, university-wide**
Subject code	**MAT001640**
Group of courses	**YES**

	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	X				
Number of ECTS points					
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes					

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Recommended knowledge of mathematics equivalent to graduating from high school at the advanced level.

SUBJECT OBJECTIVES

C1 Understanding the basic concepts and the differential and integral calculus of functions of one variable, and acquire the skills to use them to study the waveform functions and engineering calculations.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge a student

PEK_W01 knows the properties of the function; knows the methods of determining boundaries and asymptotes functions; familiar with the concept of continuity and discontinuity points classification;

PEK_W02 knows the basics of differential calculus of functions

PEK_W03 has a basic knowledge of indefinite integral, knows the structure of the definite integral and its properties, he knows the concept of the improper integral

relating to skills a student

PEK_U01 is able to calculate limits of sequences and functions, set asymptote functions, use L'Hospital theorem to the indeterminate forms, check the continuity of functions

PEK_U02 can calculate the derivatives and interpret the results, can make use of the differential in the estimate calculus, can examine the property and conduct functions of one variable

PEK_U03 can determine the indefinite integral of elementary functions and rational functions, can calculate and interpret the definite integral, is able to solve engineering problems using integrals

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1,2	Series and Basic criteria of convergence. Limit of a function at a point (proper and improper). The left- and right-hand limits. The technique of calculating the limits. Limits of basic indeterminate forms.	4
Lec 3	Continuity of a function at point and on an interval. One-sided continuity functions. Discontinuity points and their types. Theorems on continuous functions on a closed interval and their applications. Approximate solving equations	2
Lec 4,5	The derivative of a function at a point. One-sided and improper derivatives. Derivatives of basic elementary functions. Differentiation. Derivatives of higher orders. Geometric and physical interpretation of the derivative. Tangent.	4
Lec 6,7	Differentials and its application to approximate calculations. Mean value theorems (Rolle`a, Lagrange). Examples of applications of the Lagrange theorem. Taylor and Maclaurin formulas and their applications. L'Hôpital's rule.	4
Lec 8,9	Intervals of monotonicity of a function. Local extrema of the functions. Necessary and sufficient conditions of existence for local extremes. Convex and concave functions and points of inflection. Examination of a function.	4
Lec 10	Indefinite integrals and basic properties. Integration by parts. Integration by substitution.	2
Lec 11,12	Integration of rational and trigonometric functions.	4
Lec 13,14	The definition of definite integral. Geometric and physical interpretation. Properties of the definite integral. The average value of the function on the interval. Newton - Leibniz theorem. Integration by parts and by substitution.	4
Lec 15	Improper integral of type 1. The comparative criterion and quotient convergence. Applications of integrals in geometry (area, arc length, volume of the rotary body, surface area of the solid of revolution) and technology.	2
	Total	**30**
Form of classes - class		**Number of hours**
Cl 1,2	Series and Basic criteria of convergence. Limit of a function at a point (proper and improper). One-sided limits. The technique of calculating the limits. Limits of basic unmarked forms.	4
Cl 3	Continuity of a function at point and on a segment. Discontinuity points and their types. Theorems on continuous functions on a closed segment and their applications. Approximate solving equations.	2
Cl 4,5	The derivative of the function at the point. One-side and improper derivatives. Derivatives of basic elementary functions. Differentiation. Derivatives of higher orders. Geometric and physical interpretation of the derivative. Tangent.	4
Cl 6,7	Differentials and its application to approximate calculations. Mean value theorems (Rolle`a, Lagrange). Examples of applications of the Lagrange theorem. Taylor and Maclaurin formulas and their applications. L'Hôpital's rule.	2
Cl 7,8	Segments of monotonicity of a function. Local extremes of the functions. Necessary and sufficient conditions of existence of local extremes. Convex and concave functions and points of inflection. Examination of a function.	4
Cl 9	Indefinite integrals and basic properties. Integration by parts. Integration by substitution.	2
Cl 10,11	Integration of rational and trigonometric functions.	4
Cl 12,13	The definition of definite integral. Geometric and physical interpretation. Properties of the definite integral. The average value of the function on the segment. Newton - Leibniz theorem. Integration by parts and by substitution.	4

Cl 14	Improper integral of the first kind. The comparative criterion and quotient convergence. Applications of integrals in geometry (area, arc length, volume of the rotary body, surface area of the solid of revolution) and technology.	2
Cl 15	Summary	2
	TOTAL	**30**

TEACHING TOOLS USED
N1 Chalkboard N2 Consultations N3 Self-education

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation**:** F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 - 2	Written exam
F2	PEK_U01 - 3	Test
P = (0.51*F1+0.49*F2); F1 and F2 must be positive		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE

[1] F. Ayres, E. Mendelson: Calculus, 5th edition, McGraw Hill, 2009.

[2] R. Adams, C. Essex, Calculus: a complete course, Pearson, 2013.

SECONDARY LITERATURE

[1] G. M. Fichtenholz, Rachunek różniczkowy i całkowy, T. I-II, PWN, Warszawa 2007.

[2] M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2002.

[3] M. Gewert, Z. Skoczylas, Analiza matematyczna 2. Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2005.

[4] R. Leitner, Zarys matematyki wyższej dla studentów cz.1, cz. 2, Wydawnictwo Naukowe PWN

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

MATH-ANALYSIS 1 MAT001640

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **ECE**

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_W01- PEK_W03	K1ECE_W02	C1	Wy1-Wy15	N1-N3
PEK_U01- PEK_U03	K1ECE_U02	C1	Cw1-Cw15	N1-N3