

FACULTY OF COMPUTER SCIENCE AND MANAGEMENT	
SUBJECT CARD	
Name in English:	MATHEMATICAL ANALYSIS II
Name in Polish:	ANALIZA MATEMATYCZNA II
Main field of study (if applicable):	COMPUTER SCIENCE
Specialization (if applicable):	
Level and form of studies:	I level, full time
Kind of subject:	obligatory
Subject code:	MAT001650
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		2			
including number of ECTS points for direct teacher-student contact (BK) classes	2,4	1,2			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
Student must complete Mathematical Analysis I with a passing grade.

SUBJECT OBJECTIVES
<p>C1. Understanding the basic methods of analysis of the graph of functions of several variables.</p> <p>C2. Understanding the concept of the definite integral of a function of two and three variables.</p> <p>C3. Understanding the practical applications of mathematical methods for the analysis of functions of several variable.</p> <p>C4. Understanding the notion of infinite series and basic convergence tests.</p>

SUBJECT EDUCATIONAL EFFECTS
<p>Relating to knowledge student:</p> <p>PEK_W1 knows basic definitions and theorems from Mathematical Analysis of functions of several variables</p> <p>PEK_W2 knows the notion of partial derivatives and the definite integral of a function of two or three variables and their basic applications</p> <p>PEK_W3 knows the notion of infinite series and basic convergence tests</p>

Relating to skills student:

PEK_U1 can calculate partial derivatives of a function of several variables

PEK_U2 can calculate double and triple integrals

PEK_U3 can decide whether an infinite series is convergent or divergent

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	The definite integral and its area interpretation. The Fundamental Theorem of Calculus.	2
Lec2	Applications of Integration: Average value of a function, Areas, Arc length, Volume of a solid.	2
Lec3	Improper integrals of type I and II. Comparison and Limit Comparison test.	2
Lec4	Functions of several variables. Cross-sections and contour lines. Graphs of typical functions of two variables.	2
Lec5	Limits and continuity. Algebra of limits and continuous functions.	2
Lec6	The partial derivative. Interpretation of partial derivatives. Higher order partial derivatives. Schwarz's Theorem	2
Lec7	The first-order differential and differentiability of a function. The gradient vector.	
Lec8	Local and global extrema. The closed and bounded region method. Optimization problems.	2
Lec9	The definite integral of a function of two variables. Iterated integrals	2
Lec10	Double integrals over normal and regular regions. Double integrals in polar coordinates.	2
Lec11	Applications of double integrals	2
Lec12	Triple integrals. Iterated integrals.	2
Lec13	Triple integrals in cylindrical and spherical coordinates	2
Lec14	Infinite series. The partial sums. Convergence and divergence tests	2
Lec15	Power series. Representations of functions as power series.	2
	Total hours	30
Form of classes - classes		Hours
Cl1	Definite integrals - interpretation and applications.	4
Cl2	Improper integrals.	2
Cl3	Functions of several variables. Continuity.	4
Cl4	Partial derivatives and differentiability of a function of several variables.	3
Cl5	Local and global extrema.	2
Cl6	Double integrals over normal and regular regions. Double integrals in polar coordinates.	5
Cl7	Triple integrals. Triple integrals in cylindrical and spherical coordinates.	4
Cl8	Infinite series.	2
Cl9	Power series.	2
Cl10	Test.	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
F-CI	PEK_U1, PEK_U2, PEK_U3, PEK_K1	quizzes, in class presentations
P-Lec	PEK_W1, PEK_W2, PEK_W3	exam

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] W.G. McCallum et al., Multivariable calculus, John Wiley & Sons, Inc.1997G. M. Fichtenholz, Rachunek Różniczkowy i Całkowy, T. I - II, PWN, Warszawa 2007
- [2] F. Leja, Rachunek Różniczkowy i Całkowy, Wydawnictwo Naukowe PWN, 2012
- [3] W. Krywicki, 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 2. Przykłady i Zadania, Oficyna Wydawnicza GiS, Wrocław 2011

SUBJECT SUPERVISORS

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CORRELATION MATRIX BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT **MATHEMATICAL ANALYSIS MAT001650** 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 C2 C3	Lec1-15, CI1-10	N1, N2, N3
PEK_W2		C2 C3	Lec11-15, CI4-7	N1, N2, N3
PEK_W3		C4	Lec14-15, CI8-9	N1, N2, N3
PEK_U1		C1	Lec6-9, CI3-5	N1, N2, N3
PEK_U2		C1 C2 C3	Lec10-13, CI6-7	N1, N2, N3
PEK_U3		C4	Lec14-15, CI8-9	N1, N2, N3
PEK_K1		C1 C2 C3 C4	Lec1-15, CI1-10	N1, N2, N3