FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Elementy analizy wektorowej**
Name in English:	**Elements of Vector Analysis**
Main field of study (if applicable):	**Electrical Engineering**
Specialization (if applicable):	
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory / university-wide**
Subject code:	**MAT001434**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	15	15			
Number of hours of total student workload (CNPS):	60	60			
Form of crediting:	crediting with grade	crediting with grade			
For group of courses mark (X) final course:					
Number of ECTS points:	2	2			
including number of ECTS points for practical (P) classes :		2			
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40	1.40			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knows differential calculus of functions of one and many variables.
2. Knows integral calculus of function of one variable. Knows double and triple integral. Knows applications of such integrals.

SUBJECT OBJECTIVES

C1. Knows definitions and properties of path and surface integrals. Gets skill in applying them to solve problems of technology.
C2. Knows elements of vector calculus.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Has basic knowledge of definitions and properties of path and surface integrals and their applications
PEK_W02 Has basic knowledge of differential operators of scalar and vector fields.

relating to skills:

PEK_U01 Can evaluate path integrals and surface integrals of scalar and vector fields and can apply them to solve problems of technology
PEK_U02 Can apply vector calculus to solve problems fo technology

relating to social competences:

PEK_K01 Can, without assistance, search for necessary information in the literature

PROGRAMME CONTENT

Form of classes - lecture		Number of hours:
Lec 1	Curves on plane and in space. Line integrals of scalar functions along curves (path integrals): Definition and basic properties. Reduction of line integral of a scalar function to single integral.	2
Lec 2	Applications of path integrals. Line integrals of vector fields: Definitions and basic properties.	2
Lec 3	Reduction of line integral of a vector field to single integral. Independence of path. Green`s theorem.	2
Lec 4	Applications of line integrals of vector fields. Surfaces.	2
Lec 5	Surface integrals of scalar functions: Definition and basic properties. Reduction of surfaces integral of a scalar field to double integral. Application of surface integrals of scalar functions.	2
Lec 6	Surface integrals of vector fields: Definitions and basic properties. Reduction of surface integral of a vector fields to double integral.	2
Lec 7	Elements of vector calculus. Stoke`s theorem. Divergence theorem.	2
Lec 8	Applications of surface integrals of vector fields.	1
	Total hours:	**15**

Form of classes - class		Number of hours:
Cl 1	Evaluation of path integrals. Applications of such integrals to problems of geometry and technology.	3
Cl 2	Evaluation of line integrals of vector fields. Investigation of independence of paths. Finding potentials. Application of Green's theorem. Applications of line integrals of vector fields to problems of technology.	4
Cl 3	Evaluation of surface integrals of scalar functions. Applications of them in geometry and technology.	2
Cl 4	Evaluation of surface integrals of vector fields. Finding differential operators of scalar and vector fields. Applications of Stoke`s theorem and divergence theorem. Applications of surface integrals of vector fields in geometry and technology.	4
Cl 5	Test.	2
	Total hours:	**15**

TEACHING TOOLS USED
N1. Lecture – traditional method
N2. Classes – traditional method (exercises solving and discussion)
N3. Consultations
N4. Student's self work – preparation for the classes.

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(W)	PEK_W01 PEK_W02	Crediting with grade
P(W)	P=F1	
F1(C)	PEK_U01 PEK_U02 PEK_K01	Test
P(C)	P=F1	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE:
[1] W. Żakowski, W. Kołodziej, Matematyka, Cz. II, WNT, Warszawa 2003. [2] T. Trajdos, Matematyka, Cz. III, WNT, Warszawa 2005. [3] M. Gewert, Z. Skoczylas, Elementy analizy wektorowej. Teoria, przykłady, zadania, Oficyna Lecdawnicza GiS, Wrocław 2004.
SECONDARY LITERATURE:
[1] G. M. Fichtenholz, Rachunek różniczkowy i całkowy, T. III, PWN, Warszawa 2007. [2] W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, Cz. II, PWN, Warszawa 2006. [3] F. Leja, Rachunek różniczkowy i całkowy ze wstępem do równań różniczkowych, PWN, Warszawa 2008. [4] B. K. Pszczelin, Analiza wektorowa dla inżynierów, PWN, Warszawa 1971.

SUBJECT SUPERVISOR
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MAT001434 - Elements of Vector Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical Engineering**

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	K1ETK_W04	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8	N.1 N.3 N.4
PEK_W02	K1ETK_W04	C.2	Lec3 Lec7	N.1 N.3 N.4
PEK_U01	K1ETK_U04	C.1	Cl1 Cl2 Cl3 Cl4	N.2 N.3 N.4
PEK_U02	K1ETK_U04	C.2	Cl2 Cl4	N.2 N.3 N.4
PEK_K01	K1ETK_K04	C.1 C.2	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Cl1 Cl2 Cl3 Cl4 Cl5	N.1 N.2 N.3 N.4