Kielce University of Technology

FACULTY OF MECHATRONICS AND MECHANICAL ENGINEERING

Annex 9
to the Rector's Ordinance No. 35/19
of 12 June 2019

COURSE SPECIFICATION

Course code	**M#1-S1-ME-201**
Course title in Polish	**Matematyka**
Course title in English	**Mathematics**
Valid from (academic year)	**2019/2020**

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**first-cycle**
Type of education	**academic**
Mode of study	**full-time**
Specialism	**all**
Department responsible	**Department of Manufacturing Engineering and Metrology**
Course leader	**dr inż. Paweł Łabędzki**
Approved by	

COURSE OVERVIEW

Course type	**basic**
Course status	**compulsory**
Language of instruction	English
Semester of delivery	**semester 2**
Pre-requisites	
Examination required (YES/NO)	YES
ECTS value	**5**

Mode of instruction	**lecture**	**class**	**laboratory**	**project**	**seminar**
No. of hours per semester	**30**	**30**			

LEARNING OUTCOMES

Category of outcome	Out-come code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	The student understands the concept of a function of two variables, the concept of the domain of such a function and the concept of a contour line. The student understands the concept of partial derivative (including higher order) of functions of two variables and the total differential of such a function. The student understands the concepts of maximum and minimum local functions of two variables and knows the rules of their search (in terms of the use of derivatives to the second order). The student understands the concept of an implicit function and knows the rules for calculating the derivative of such a function. The student understands the concept of a conditional extremum and knows the method of calculating such an extremum.	MiBM1_W01
	W02	The student understands the concept of a double integral and knows the most important rules for calculating such integrals. The student knows how to use the double integral to calculate the volume of a solid (in simple cases), the mass of a flat object and the area of a figure. The student understands the concepts of line integrals (undirected and directed), knows the rules of their calculation and knows and understands Green's formula.	MiBM1_W02
Skills	U01	The student is able in simple cases for a given function of two variables to find its natural domain and draw its contours corresponding to the given values. The student is able to calculate partial derivatives (including higher orders) of functions of two variables and write down the total differential of such a function and apply it to approximate calculations.	MiBM1_U01
	U02	The student is able in simple cases for a given function of two variables to find all its local maxima and minima. The student is able to find the derivative of a given implicit function. The student is able in simple cases to solve the problem of finding the conditional extreme of a function of two variables. The student is able to calculate double integrals in simple cases. The student is able in simple cases to use double integrals to calculate volumes, masses and areas. The student is able in simple cases to calculate the line integrals (undirected and directed) and use Green's formula to calculate some directed integrals	MiBM1_U01
Competence	K01	He understands the need for continuous training and improving his competences in the field of mathematical methods used to solve typical engineering problems. He can complete and improve the acquired knowledge and skills in the field of methods of solving equations and systems of linear equations, matrix calculus, vector calculus.	MiBM1_K06
	K02	He is aware of the responsibility for their own work to obey the rules can work in a team.	MiBM1_K04

COURSE CONTENT

Type of instruction*	Topics covered
lecture	The concept of a function of two variables, the main related concepts. Partial derivatives (including higher orders) of functions of two variables. Complete difference, its application to rough calculations. Local extremes of functions of two variables. Implicit function, computation of the derivative of the implicit function. Conditional extremes. Double integral: geometric sense and definition. Integration along a rectangle and over the normal area. Integration with the help of dividing the area into normal areas. Change of variables in the double integral; transition to polar coordinates. Application of the double integral to calculate volumes, masses and areas. Undirected curvilinear integrals (on the plane). Curvilinear integrals directed (on the plane). Green's formula, its application. Examples of solving tasks on the various topics above.
class	Functions of two variables: domain, contours. Partial derivatives (including higher orders) of functions of two variables. Complete difference, its application to rough calculations. Local extremes of functions of two variables. Implicit function, computation of the derivative of the implicit function. Conditional extremes. Double integral: rectangle and normal integration. Double integral: integration over the normal area and with the help of dividing the area into normal areas. Transition to polar coordinates in a double integral. Application of the double integral to calculate volumes, masses and areas. Curvilinear integrals undirected and directed (on the plane). Application of Green's formula to compute directed line integrals.

*) Please delete rows in the table above that are not applicable.

ASSESSMENT METHODS

Outcome code	Methods of assessment *(Mark with an X where applicable)*					
	Oral examination	Written examination	Test	Project	Report	Other
W01		x				
W02		x				
U01			x			
U02			x			
U03			x			
K01						x
K02						x

ASSESSMENT TYPE AND CRITERIA

Mode of instruction*	Assessment type	Assessment criteria
lecture	**examination assessment**	The pass mark is a minimum of 50% for all the in-class tests.
class	non-examination assessment	Class attendance. The pass mark is a minimum of 50% for all the in-class tests.

*) Please delete rows in the table above that are not applicable.

OVERALL STUDENT WORKLOAD

ECTS weighting								
	Activity type	Student workload					Unit
		L	C	Lab	P	S	
1.	Scheduled contact hours	30	30				h

2.	Other contact hours (office hours, examination)	4	2				h
3.	**Total number of contact hours**	**66**					h
4.	**Number of ECTS credits for contact hours**	**2,6**					ECTS
5.	**Number of independent study hours**	**59**					h
6.	**Number of ECTS credits for independent study hours**	**2,4**					ECTS
7.	**Number of practical hours**	**63**					h
8.	**Number of ECTS credits for practical hours**	**5**					ECTS
9.	**Total study time**	**125**					h
10.	**ECTS credits for the course** *1 ECTS credit = 25-30 hours of study time*	**5**					ECTS

READING LIST

1. Gdowski B., Pluciński E., Zadania z rachunku wektorowego i geometrii analitycznej, PWN, Warszawa 1982.
2. Hożejowska S., Hożejowski L., Maciąg A., Matematyka w zadaniach dla studiów ekonomiczno-technicznych, Wydawnictwo Politechniki Świętokrzyskiej, Kielce 2005.
3. Jurlewicz T., Skoczylas Z., Algebra liniowa 1. Definicje, twierdzenia, wzory, Oficyna wydawnicza GiS, Wrocław 2004.
4. Tarnowski S., Wajler S., Matematyka w zadaniach cz.II. PŚk. Kielce
5. Trajdos T., Matematyka. Cz. 3, WNT, Warszawa 1987.
6. Wstęp do matematyki, red. A Płoski, Wydawnictwo Politechniki Świętokrzyskiej, Kielce 1995.
7. Skrypt z Algebry: http://wzimk-moodle.tu.kielce.pl/