Bialystok University of Technology									
Field of study	**Computer Science**							**Degree level and programme type**	**Engineer's degree full-time programme**
Specialization/ diploma path	**---**							**Study profile**	academic
Course name	**Calculus 2**							**Course code**	**FCS-00070**
								Course type	obligatory
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	**Semester**	3
	30	30						**No. of ECTS credits**	**6**
Entry requirements	Calculus (FCS-00002),								
Course objectives	The course will introduce the concepts of limit of a sequences, convergence of functional series, the concept of the gradient and Jacobi matrix of functions of n-variables needed to solve practical engineering problems, multiple integrals. Teaching students to calculate derivatives of functions of many variables, multiple integrals of functions of many variables. Teaching a student to solve optimization problems related to the differential calculus of functions of several variables. An emphasis will be put on developing skills needed to formulate and solve engineering tasks.								
Course content	Lecture: 1. Functional series, pointwise and uniform convergence. 2. Power and trigonometric series. 3. Derivatives of functions of several variables: gradient, Jacobi matrix. 4. Extremes of functions of several variables. 5. Theorem on inverse function and implicit function. 6. Multiple integrals. 7. Applications of multiple integrals. Exercises: 1. Functional series, pointwise and uniform convergence. 2. Power and trigonometric series. 3. Derivatives of functions of several variables: gradient, Jacobi matrix. 4. Extremes of functions of several variables. 5. Theorem on inverse function and implicit function. 6. Multiple integrals. 7. Applications of multiple integrals. Labs: 1. Drawing graphs, domains and level curves of functions of several variables. 2. Visualization of differential calculus of many variables. 3. Drawing spatial surfaces needed in multiple integration. 4. Computer support in solving optimization problems.								
Teaching methods	informative lecture, lecture problem, classic problem method, programming, subject exercises,								
Assessment method	Lectures - written exam, exercises - two written tests, labs - reports, short tests.								

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
LO1	Student has knowledge on mathematical analysis, including differential calculus of several variables and multiple integrals needed to solve practical engineering problems	K_W01
LO2	Student knows the techniques and methods in the field of mathematical analysis	K_W01
LO3	Student uses basic tools of mathematical analysis, including a derivative of a function of many variables and multiple integral	K_U01
LO4	Student is able to use analytical methods to formulate and solve engineering tasks	K_U01
LO5	Student can use IT tools to solve problems in the field of mathematical analysis	K_U01 K_U10

Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	exam	L
LO2	exam	L
LO3	written tests	C
LO4	written tests	C
LO5	short tests, reports	Sw

Student workload (in hours)	**No. of hours**
1 - Participation in lectures -	30
2 - Participation in classes -	30
3 - Preparation to classes -	15
4 - Doing homeworks -	15
5 - Participation in student-teacher sessions -	5
6 - Preparation to the exam -	10
7 - Presence during the exam -	5
8 - Preparation to written tests -	10
9 - Participation in labs -	15
10 - Preparation to labs -	15
TOTAL:	**150**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	85 (2)+(1)+(9)+(5)+(7)	3.4
Student workload – practical activities	100 (4)+(3)+(2)+(9)+(8)+(10)	4.0

Basic references	1. J. Stewart, Calculus: Early Transcendentals, Thomson, 2012 2. J. Stewart, Multivariable Calculus, Brooks/Cole 2011 3. Marsden, Jerrold., and Alan. Weinstein. Calculus II. 2nd ed. New York: Springer-Verlag, 1985. Print. Undergraduate Texts in Mathematics.	
Supplementary references	1. G M Fichtenholz, Integral & differential calculus, vol II,III, VEB Deutscher Verlag der Wissenschaften, Berlin, 1990. 2. A.A. Šestakov, A course of higher mathematics : integral calculus, differential equations, vector analysis, Mir, Moscow 1990.	
Organisational unit conducting the course	Department of Mathematics	**Date of issuing the programme**
Author of the programme	dr Ewa Girejko	Feb. 18, 2022

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW – field work,S – seminar