COURSE DESCRIPTION CARD - SYLLABUS

Course name
Selected topics in Mathematics

Course

Field of study	Year/Semester
Mechanical Engineering	1/2
Area of study (specialization)	Profile of study
	general academic
Level of study	Course offered in
First-cycle studies	polish
Form of study	Requirements
part-time	compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
18	0	0
Tutorials	Projects/seminars	
9	0	

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

 dr inż. Agnieszka Szawioła

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Faculty of Control, Robotics and Electrical Engineering

Institute of Mathematics

Responsible for the course/lecturer:

Prerequisites

1. Knowledge of algebra and geometry, differential calculus and integral calculus of functions of one variable in the scope of the 1st semester of study.

2. Logical thinking, learning with understanding, the use of textbooks.

3. Willingness to acquire new knowledge and the need for systematic self-education.

Course objective

1. Getting to know the problems of differential and integral calculus of functions of several variables,

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line integrals and ordinary differential equations. Indication of examples of the application of the learned issues in technology.

Course-related learning outcomes

Knowledge

1. Has basic knowledge of mathematics including differential and integral calculus of functions of two variables, line integrals, and known differential equations.

2. Defines the basic concepts in the field of mathematics considered.

Skills

1. He can apply differential and integral calculus in physics and mechanics.

2.Can, using mathematical concepts, describe simple processes in mechanics.

Social competences

1. He reliably acquires knowledge and acts honestly when verifying knowledge.

2.Understands the need for lifelong learning, can inspire others to learn.

3. Adheres to the principles of savoir-vivre.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Assessment on the basis of a written exam conducted during the exam session at the end of the semester. The assessment also takes into account the student's activity during classes.

Tutorials:

 Assessment on the basis of 3 tests and activity in the classroom.

Programme content

Program:

Update 2019/2020

DIFFERENT CALCULUS OF FUNCTIONS OF SEVERAL VARIABLES; definition of the function of two variables, limits and continuity of the function of two variables, partial derivative, Schwarza theorem, a total differential, extreme of functions of two variables, derivative of a entangled function.

MULTIPLE INTEGRALS; normal area, double integral; evaluating, a iterated integral, reversing the order of integration, exchange of variables in the double integral - polar coordinates, the use of a double integral in geometry and mechanics -Cartesian and polar coordinates.

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LINE INTEGRALS; not-directed line integral and of applying them in mechanics, directed line integrals, directed line integral independent of the path, directed line integrals along simple closed curve, Green's theorem, the area and work using the line integrals.

ORDINARY DIFFERENTIAL EQUATIONS; definition of ordinary differential equation, general, particular and singular solution, initial-value, differential equation with separated variables, first order linear differential equation; method of constant change, Bernoulli's differential equation, second order linear differential equation with real constant coefficients; the method of prediction and variation of constants.

Teaching methods

Lecture:

At the lecture, the theory is supported by examples. The lecture is conducted in an interactive way with formulating questions towards students. Completed with self-solve tasks, which are verified and have an impact on the final grade.

Tutorials:

The exercises include an example of solving tasks on the blackboard (by the teacher and students) along with the analysis of subsequent stages. The way students solve the problem on the blackboard is reviewed by the tutor.

Bibliography

Basic

1. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, t. I,II, PWN, Warszawa 2006.

2. F. Leja, Rachunek różniczkowy i całkowy. Państwowe Wydawnictwo Naukowe, Warszawa 1978

3. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka cz. I, II, III Wydawnictwo Politechniki Poznańskiej, Poznań 2001

Additional

1. M. Gewert, Z. Skoczylas, Analiza matematyczna 2, Oficyna Wydawnicza GiS, Wrocław 2006

2. Dennis G. Zill, Calculus with Analytic Geometry, Prindle,Weber && Schmidt, Boston 1985

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for tutorials, preparation for tests and the final exam) [1]	55	2,0

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[1] delete or add other activities as appropriate