COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics

Course

Field of study
Mechanical and Automotive Engineering
Area of study (specialization)

Level of study
First-cycle studies
Form of study
part-time

Year/Semester
1/1
Profile of study
general academic
Course offered in
Polish
Requirements
compulsory

Number of hours

Lecture
36
Laboratory classes
0
Other (e.g. online)
0
Tutorials
18
Projects/seminars
0

Number of credit points

6

Lecturers

Responsible for the course/lecturer:
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Faculty of Control, Robotics and Electrical Engineering

Institute of Mathematics

Responsible for the course/lecturer:

Prerequisites

1. The basic mathematics of secondary school.

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

3. Awareness of the purpose of learning and acquiring new knowledge

Course objective

1. Getting to Know the issues of algebra and geometry, differential and integral calculus and the possibility of their application in subjects directional.

Course-related learning outcomes

Knowledge

Has knowledge in the field of mathematics, including algebra, analysis, theory of differential equations, probability, analytical geometry necessary to: describe the operation of discrete mechanical systems, understand computer graphics methods, describe the operation of electrical and mechatronic systems.

Skills

Can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions.

Can assess material, environmental and labor costs for making a simple machine.

Has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.

Social competences

Is ready to critically assess his knowledge and received content.

Is ready to fulfill social obligations and co-organize activities for the benefit of the social environment.

Is ready to initiate actions for the public interest.

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 4 tests and activity in the classroom.

Programme content

Update 2020/2021

Complex numbers (algebraic, trigonometric, exponential, action, Moivre's formula, Euler's patterns, polynomials). Matrices and determinants (actions, properties, Laplace theorem). Systems of linear equations (Cramer's theorem, Kronecker-Capelli theorem). Geometry in three-dimensional space (actions on vectors and their properties, a straight line and a plane in space). Functions of one variable (number sequences, monotonicity and limit, Euler number, limit and continuity of functions, indeterminate symbols). Differential calculus of the function of one variable (derivative of a function, determination, interpretation, calculation, differential of function and its application, theorems on average value and their applications - extremes of function, concavity and convexity, inflection points, de LHospital rule, function test). Indefinite integral (original function, integration of sum and product, integration by substitution and parts, integration of rational functions and non-measurable ones). Definite integral (determination, interpretation and relation to the field, properties, improper integrals, applications - calculation of flat area fields, curve arc length, volume and surface area of rotational solids). Analytical geometry in space; equation of plane and line, mutual position of line and plane. Equations of solids in space; cylinder, paraboloid, hyperboloid, cone, sphere.

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. 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 i II, Wydawnictwo Politechniki Poznańskiej, Poznań 2001

Additional

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

2. H. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Oficyna Wydawnicza GiS, Wrocław 2006.

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,0
Classes requiring direct contact with the teacher	57	2,0
Student's own work (literature studies, preparation for tutorials, preparation for tests and the final exam) [1]	93	4,0

[1] delete or add other activities as appropriate