COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematics

Course

Field of study

Mechanical Engineering

Year/Semester

1/1

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

60

Laboratory classes

0

Other (e.g. online)

0

Tutorials

30

Projects/seminars

0

Number of credit points

7

Lecturers

Responsible for the course/lecturer:

dr inż. Agnieszka Szawioła

e-mail: : agnieszka.szawiola@put.poznan.pl

phone: 61 665 2712

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

1. Has basic knowledge of mathematics including algebra, analysis, differential and integral calculus.

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 and mechanical problems.

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 4 tests and activity in the classroom.

Programme content

Update 2019/2020

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). The surfaces of the second degree (the equation of a circular cylinder, parabolic roller, rotary paraboloid, hyperboloids, spheres, ellipsoids). Functions of one variable (number sequences, monotonicity and boundary, Euler number, boundary and continuity of functions). 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	200	7,0
Classes requiring direct contact with the teacher	90	4,0
Student's own work (literature studies, preparation for tutorials, preparation for tests and the final exam) [1]	110	3,0

[1] delete or add other activities as appropriate