COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [S1IMe1E>MAT1]

Course

Field of study
Mechanical Engineering

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
45

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

The student has basic knowledge of mathematics at the secondary school level. The student is able to perform elementary algebraic operations and solve simple equations and inequalities and is aware of the need for further education.

Course objective

The main aim of this course is to familiarize students with the basic concepts of higher mathematics. After completing the course, students will be able to perform basic operations on matrices and vectors, determine limits of sequences and functions, plot graphs of elementary functions, calculate derivatives and analyze the behavior of functions, compute indefinite and definite integrals, perform algebraic operations on complex numbers, examine the convergence of real-number series, calculate partial derivatives, and determine extrema of functions of two variables.

Course-related learning outcomes

Knowledge:
The student has knowledge of mathematics, including selected areas of mathematical analysis, algebra, and analytic geometry.

Skills:
The student is able to apply mathematical methods in the analysis of technical and engineering problems.

Social competences:
The student is aware of the need to deepen and expand their knowledge.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Tutorials:
Skills acquired during tutorials are verified through two written tests. To pass the tutorials, the student must obtain at least 50% of the total points from both tests combined.
Lecture:
Knowledge acquired during lectures is verified through a written examination. To pass the lecture component, the student must obtain at least 50% of the available points.
Grading system:
0-50% - 2.0
50-60% - 3.0
60-70% - 3.5
70-80% - 4.0
80-90% - 4.5
90-100% - 5.0

Programme content

Lecture:
Matrix operations and determinants.
Vector algebra and geometry.
Sequences of real numbers.
Functions of one variable.
Differential calculus and curve analysis.
Indefinite and definite integrals and their applications.
Complex numbers.
Series of real numbers and convergence tests.
Functions of two variables and partial derivatives.
Power series, Taylor and Maclaurin series.
Tutorials:
Practical exercises related to lecture topics, including calculations involving matrices, vectors, limits, derivatives, integrals, series, complex numbers, and functions of several variables.

Course topics

The course covers fundamental topics of higher mathematics, including elements of linear algebra, mathematical analysis, and analytic geometry. The lecture component focuses on matrix operations and determinants, vector algebra and geometry, sequences and series of real numbers, functions of one and two variables, differential and integral calculus, complex numbers, and power series. Particular emphasis is placed on limits, continuity, derivatives, curve analysis, definite and indefinite integrals, as well as applications of Taylor and Maclaurin series.
Tutorial classes are devoted to solving calculation-based problems corresponding to the lecture material. Students practice algebraic and analytical methods, analyze functions, compute integrals and series, and apply mathematical tools to technical and engineering-related problems, thereby reinforcing theoretical knowledge and developing practical problem-solving skills.

Teaching methods

Lectures: traditional lectures presenting theory in connection with students' prior knowledge.
Tutorials: blackboard-based problem solving under the supervision of the instructor.

Bibliography

Basic:
W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach 1, PWN, Warszawa 2018.
W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach 2, PWN, Warszawa 2018.
M. Gewert, Z. Skoczylas, Analiza matematyczna 1 i 2, GiS, Wrocław.
T. Jurlewicz, Z. Skoczylas, Algebra i geometria analityczna, GiS, Wrocław.

Additional:
M. Gewert, Z. Skoczylas, Analiza matematyczna - przykłady i zadania.
T. Jurlewicz, Z. Skoczylas, Algebra i geometria analityczna - przykłady i zadania.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	77	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	73	3,00