COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [S1ZiIP2>MAT1]

Course

Field of study
Management and Production Engineering

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

The student should have knowledge of mathematics in the field of high school and basic scope extended by differential calculus (in the scope of extended).

Course objective

Acquainting with problems of linear algebra and learning methods and applications of differential functions of one and two variables.

Course-related learning outcomes

Knowledge:
The student has knowledge of the principles of solving polynomials, exponents and roots in the set of complex numbers.
The student has knowledge of the properties of number sequences.
The student has knowledge of the derivative and how to determine it and how to use it.
The student has knowledge of matrices, methods of elementary operations on matrices, principles of solving systems of linear equations.
The student has knowledge of calculating partial derivatives of functions of many variables and the

principles of determining extremes of functions of many variables.

Skills:
The student is able to perform operations on complex numbers, find real and complex roots of certain types of polynomials.
The student can examine the monotonicity of sequences and calculate the limit.
The student is able to determine the derivative of a function of one variable, apply it to the limits of functions (de L"Hospital rule) and study the variability of functions.
The student can perform operations on matrices, determine the inverse matrix of elementary operations methods, calculate the determinant of matrices, solve a system of linear equations using the Gaussian elimination method.
The student is able to determine partial derivatives and local extremes of functions of many variables.

Social competences:
The student is aware of the level of its knowledge in the field of energy research.
The student is aware of the deepening and expansion of knowledge in order to solve new technical problems.
The student is able to properly set priorities for the implementation of tasks specified by himself or others, including is able to think and act strictly in the area of description of processes in technical and exact sciences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows: Knowledge acquired as part of the lecture is verified by a 60-minute exam conducted in the exam session. Passing threshold: 50% of exam points and student activity during classes. Lecture for the grade.
Assessment issues based on which questions are developed. They will be sent via e-mail using the university e-mail system. Knowledge acquired during the exercises is verified by 4-5 tests and activity during classes. Passing threshold: 50% of points the sum of points obtained from tests and activity during classes. Assignment of grades to percentage ranges of results: <90-100> very good; <80-90) good plus; <70-80) good; <60-70) satisfactory plus; <50-60) satisfactory; <0-50) unsatisfactory.

Programme content

Complex numbers. Numerical Sequences. Differential calculus of one variable function. Matrix algebra. Differential calculus of multiple variables functions.

Course topics

LECTURE:
COMPLEX NUMBERS: Gaussian form, trigonometric form, Euler form, exponentiation and square root, polynomials.
NUMBER SEQUENCES: limitation, monotonicity, string boundaries, definition of the number e and its application.
DIFFERENTIAL CALCULUS OF ONE VARIABLE FUNCTION: derivative of function, extrema of differentiable function, monotonicity intervals, second derivative - convexity, concavity, inflection points, derivatives of higher orders, de L"Hospital rule.
DIFFERENTIAL CALCULUS OF MULTIPLE VARIABLES FUNCTIONS: partial derivative, extremum of functions of two variables.
EXERCISES:
COMPLEX NUMBERS: Gaussian form, trigonometric form, Euler form, exponentiation and square root, polynomials.
NUMBER SEQUENCES: monotonicity, string boundaries.
DIFFERENTIAL CALCULUS OF FUNCTIONS OF ONE VARIABLE: derivative of a function, extrema of a differentiable function, monotonicity intervals, second derivative - convexity, concavity, inflection points, derivatives of higher orders, de L"Hospital rule.
DIFFERENTIAL CALCULUS OF MULTIPLE VARIABLES FUNCTIONS: partial derivative, extremum of functions of two variables.

Teaching methods

Lecture: conducted using a visualizer, theory illustrated with examples. Conducted in an interactive way with the formulation of questions to a group of students. Initiating discussions during the lecture.
Exercises: solving tasks given by the teacher on the board along with analyzing the next stages. The method of solving the task by students on the board is reviewed by the tutor. Completed with tasks for independent solution at home.

Bibliography

Basic:
1. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, T. 1-2, PWN, Warszawa 2011.
2. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka dla studentów uczelni technicznych, T. 1-3, Wydawnictwo Politechniki Poznańskiej, Poznań 2004.
3. M. Gewert, Z. Skoczylas, Analiza matematyczna 1/Definicje, twierdzenia, wzory/ Oficyna Wydawnicza GiS, Wrocław 2011.
4. M. Gewert, Z. Skoczylas, Analiza matematyczna 1/Przykłady i zadania/ Oficyna Wydawnicza GiS, Wrocław 2011.
5. F. Leja, Rachunek różniczkowy i całkowy, PWN, Warszawa 2008.
6. G. M. Fichtenholz, Rachunek różniczkowy i całkowy, PWN, Warszawa, 1986.
7. H. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Oficyna Wydawnicza GiS, Wrocław 2006.

Additional:
1. W. Żakowski, Matematyka, T. 1-2, WNT, Warszawa 2003.
2. W. Stankiewicz, J. Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, T. 1-2, PWN, Warszawa 2003.
3. M. Lassek, Matematyka dla studentów technicznych, T. 1-2, Wydawnictwo Wspierania procesu edukacji, Warszawa 2004.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	62	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	38	1,50