COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [N1MiBM2>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
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
24

Laboratory classes
0

Other
0

Tutorials
16

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

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Prerequisites

Knowledge of the general school mathematics curriculum. The ability to think logically. The ability to describe simple problems mathematically. The ability to work in a group.

Course objective

Assimilation and consolidation of basic mathematical concepts by means of examples and the ability to using mathematical apparatus.

Course-related learning outcomes

none

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written examination during the session,
Exercises: colloquium + short question papers

Programme content

Lecture: Elements of linear algebra: matrices and determinants, systems of linear equations, vectors, product of scalar and vector product, plane and line in space. Functions of one variable: graphs of elementary and
elementary and measurable functions, limits of functions, inverse functions. Differential calculus of functions of one variable.
Exercises: practical tasks related to the content covered in the lectures.

Course topics

1. Complex numbers - algebraic form (modulus, conjugate number, arithmetic of complex numbers, second degree roots), trigonometric form, de Moivre's formula, root theorem of complex numbers.
2 Elements of linear algebra. Matrices and operations on matrices. Determinants, properties, elementary transformations. Laplace's expansion. Inverse matrix. Systems of linear equations, Cramer's formulae, row of matrices, Kronecker-Capelli's theorem.
3 Vector calculus in space. The scalar and vector product of two vectors.
4 The definition of a number sequence. Monotonicity, limit, convergence of sequences. Arithmetic of limits. The theorem of three sequences. Definition of Euler's constant. Numerous examples.
5 The definition of a function. Domain and counter-domain of a function. The differentiable function and the "on" function. Monotonicity of functions. Even and odd functions. Periodicity of functions. Complex functions. Inverse functions.
6. Review of elementary functions - polynomial, power, exponential, logarithmic, trigonometric, cyclometric functions. Formulas, graphs, properties.
7. Definition of the derivative of a function. Geometric interpretation. Rules of differentiation. Derivative of a complex function. Mean value theorems and their application to the study of monotonicity of functions. Necessary condition for the existence of a local extremum of a differentiable function. Sufficient condition of existence of a local extremum of a differentiable function. De l "Hospital's rule.
Antiderivative function, definition and properties of the indeterminate integral. Integrals of elementary functions. Theorems on integration by parts and integration by substitution. Integration of rational functions. Integration of trigonometric functions. Integration of selected types of non-rational functions.

Teaching methods

Lecture: presentation file + whiteboard,
Exercises: solving tasks on the whiteboard with discussion of the solutions obtained and interpretation of the results.

Bibliography

1. W. Żakowski, Matematyka, T.1 i T.2, WNT, Warszawa 2003.
2. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 i 2 (Definicje, twierdzenia, wzory), GiS, Wrocław 2011.
3. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 i 2 (Przykłady i zadania), GiS, Wrocław 2011.
4. T. Jurlewicz, Z. Skoczylas, Algebra i geometria analityczna 1, (Definicje, twierdzenia, wzory), GiS, Wrocław 2007.
5. T. Jurlewicz, Z. Skoczylas, Algebra i geometria analityczna 1, (Przykłady i zadania), GiS, Wrocław 2007.
6. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, T.1, T.2, PWN, Warszawa 2011.
7. M. Grzesiak, Liczby zespolone i algebra liniowa, Wydawnictwo PP, Poznań 1999

Breakdown of average student's workload

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