

## Course Syllabus

Academic year: 2018-2019

Institution	University of Petroșani
Faculty	Mechanical and Electrical Engineering
Field of study	Industrial engineering
Level	Bachelor
Program of study	Machine Building Technology

Course	<b>Mathematical analysis</b>
Code	2BB1OD03
Year of study (semester)	II (III)
Number of hours	56
Number of credits	5
Professor	Professor eng.,Ph.D. KECS Wilhelm

No.	Topic
1.	CROWDS AND FUNCTIONS. Multitudes and crowd operations. The geometric representation of the sets and. Functions. Types and classes of functions. The cardinality of a crowd.
2.	METRICAL SPACES AND VECTORIAL SPACES. Metric spaces. Vector space. Normalized vector spaces. Operators and functional.
3.	AXIOMATIC CONSTRUCTION OF THE REAL NUMBER BODY. TOPOLOGY NOTES. Axiomatic construction of the body of real numbers. Topological structure on. Theorem of Bolzano - Weierstrass. Upper boundary and lower limit properties.
4.	REAL NUMBER STRINGS. Real number strings. Convergent string, fundamental string. Cauchy's general convergence criterion. Fundamental string or Cauchy string. Operations with convergent strings.
5.	SERIES OF REAL NUMBERS. Convergence and divergence of a series. Cauchy's general convergence criterion. Absolutely convergent series and semiconverged series. Alternate series, Leibniz's criterion. Convergence criteria for series with positive terms. Series operations.

6.	<b>FUNCTIONS DIFFERENTIABLE BY A VARIABLE.</b> The first-order differential of a function. Differentiation rules. Higher order differentials. Taylor's formula for polynomials and functions.
7.	<b>ROWS AND SERIES OF REAL FUNCTIONS.</b> Real function strings. Uniform convergence criteria. Approximate approximation of continuous functions by polynomials. The Weierstrass theorem. Series of functions. Uniform convergence criteria. Properties of uniformly convergent function series. Operations with series of functions. Series of powers. Calculation formulas for the convergence range. Properties of power series. Operations with series of powers. Taylor Series.
8.	<b>MULTI-FUNCTION FUNCTIONS.</b> Topological structure in. Strings in space. Strings in metric spaces. Complete metric spaces. The principle of contraction. True vector vector functions. The limit of a function at a point. Continuous functions and uniform continuous functions. First-order partial derivatives. Higher partial partial derivatives. Operator D of Laplace. Operators diverge and rotor. First order and higher order differential for multi-variable functions. Partial derivatives of composite functions. Derivative in one direction. Taylor's Formula for Multiple Variable Functions. Taylor series of several variables. The extremes of several variable functions. Implicit and extreme conditional functions.
9.	<b>RIEMANN INTEGRAL.</b> The Riemann sum and the Darboux amounts. Integrable Riemann features. Integrability criteria. Embedded function classes. Continuous function class on portions. General properties of integrable functions and integrals. Formula formulas for integrals. Primitive. Leibniz-Newton's formula. Methods of calculating primitives. Integration by parts for defined integrals. The method of changing the variable (or substitution) in the calculation of undefined integers and defined integries. Changing the variable to the defined integer. Incorrect and integral integrations that depend on a parameter. Applications of defined integrals.
10.	<b>CURVILINEAR INTEGRALS.</b> Integrates the curvature of the second species (or in relation to the coordinates). Calculation formula of the second case curvilinear. Properties of the second case curvilinear. Integral curviline along a closed curve. The conditions that a complete curvilinear (of the second) do not depend on the integration path. Integrating the first curvilinear (or in relation to the length of the curve arc). The properties of the first curvilinear integrals. Dependence between the first and second case curvilinear integers. Applications of the first curvilinear integrals.
11.	<b>DOUBLE INTEGRAL.</b> Definition of integralei duble. Integrability criteria. Properties of the double integrals. Calculation of Double Inserts. Green's formula. Change the variables to the double integer. The formula of the change of variables to the double integer. Applications of double integrals in geometry and mechanics.
12.	<b>THE TRIPLE INTEGRAL.</b> Definition. Properties. Calculation principle of triple integral. Changing variables on the triple integrals. Switching to spherical coordinates. Applications of triple integrals.



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13.	SURFACE INTEGRALS. Forms of representation of a surface portion. Formulas for calculating the area of a surface portion. Oriented surfaces. The definition of the surface integrity with respect to the area (the first type surface integral). Properties. Calculation principle. The definition of the surface integrity with respect to the coordinates (surface type integrals of the second type). Properties and calculation principle. Applications of the surface integrity.
14.	INTEGRAL FORMULAS. Gauss-Ostrogradski. Stokes formula.