Level: bachelor

Course title: Mathematics II

Status: obligatory

ECTS: 8

Requirements: Mathematics I

Learning objectives

Students obtain the basic mathematical formalism, which will enable them to independently follow, understand and conclude further syllabus from mathematics, theoretical and mathematical physics, as well as other fields in physics. The aim of this course is to enable students to approach problem solving in mathematical physics with understanding.

Learning outcomes

Comprehension of various aspects from fields of series, differential and integral calculus of functions of several variables and complex analysis.

Syllabus

Theoretical instruction

Improper integrals. Series. Numerical series. Criteria for ordinary and uniform convergence. Conditional convergence. Functional sequences and series. Properties of power series. Series expansions. Calculation of the sum of power series. Fourier series. Convergence and Fourier series expansions.

Real functions of several variables. Differential calculus. Space Rn. Limits and continuity. Partial derivatives. Differentiability. Differentials. Taylor formula. Partial derivative of compound functions. Derivative in the direction. Equation of the tangent plane and normal to the surface. Extremes and conditional extremes. Theorem on implicit functions. Introduction to vector analysis. Vector functions of one, two and three variable. Transformation of coordinates. Integral calculus. Multiple integrals. Change of variables and calculation of multiple integrals. Curvilinear and Surface integrals of the first and second kind. Independence from the path of curvilinear integral of the first and second kind. Formulas of Green, Gauss-Ostrogradsky, Stokes. Field theory. Gradient, Curl, Divergence, calculating the flux.

Functions of complex variable. Analytical functions, examples (polynomial, exponential function, logarithmic function, trigonometric, hyperbolic functions). Conformal mapping. Cauchy integral theorems. Cauchy integrals forms. Taylor series expansion of analytical function. Applications. Isolated singularities, typos, properties. Laurent series expansion. Residues Theorems and applications to calculation of integrals. Analytical continuation.

Practical instruction

Exercises follow the lectures. Homework are encouraged and graded.

Weekly teaching load				Other:
Lectures: 5	Exercises: 4	Other forms of teaching:	Student research:	