Study Program: Physics

Type and level of studies: Bachelor studies

Course name: Mathematics 2

Lecturer**: Milena Lekić**

Status: Compulsory

ECTS: 10

Attendance prerequisites: **Mathematics 1**

Course aims

The students should grasp the basics of mathematical formalism that will enable them to attend and understand upcoming classes in mathematics, theoretical physics and other physics disciplines in.

Course outcome

The students have developed general abilities and knowledge of series, differential and integral calculus of multivariable functions as well as complex analyses, consulting professional literature and selecting the most adequate solution to a problem in physics using mathematical models.

Course content

Theoretical part

Series. Number series. Criteria for ordinary and uniform convergence. Conditional convergence. Functional sequences and series. Properties of power series. Series expansion. Calculating the sums of power series. Fourier series. Convergence and calculation of Fourier's lines. Real-valued functions of several real variables. Differential calculus. Space Rn. Limits and continuity. Partial derivatives. Differentiability. Differentials. Taylor's formula. Partial derivatives of complex functions. Directional derivative. Equation of the tangent plane and line perpendicular to the plane. Extremes and conditional extremes. Implicit function theorems. Introduction to vector analysis. Vector functions of one, two and three variables. Coordinate transformations. Integral calculus. Multiple integrals. Change of variables and calculation of multiple integrals. Curvilinear and surface integrals of the first and second kind. Path independence of the curvilinear integral. Theorems: Green, Gauss-Ostrogradsky, Stokes. Field theory. Gradient, rotor, divergence, flux calculation. Integrals of function parameters. Proper parametric integrals. Improper integrals. Uniform convergence. Functional properties. Integration of improper integrals. Euler integrals. Functions of a complex variable. Analytical functions, examples (polynomial, exponential, logarithmic, trigonometric, hyperbolic). Conformal mappings. Cauchy integral theorem. Cauchy‘s integral theorem. Development of analytic function in Taylor's order. Use. Isolated singularities, division, properties. Laurent series expansions. Residue theorems and its application to the calculation of integrals. Analytical continuation.

Practical Part:

Computational exercises include solving practice problems for series, multivariable functions (differential and integral calculus) and complex analyses.

Literature

1. Р. Димитријевић: Анализа реалних функција више променљивих, ауторско издање, Ниш 1999.
2. Д.С. Митриновић, Ј.Д. Кечкић: Математика II, Грађевинска књига, Београд 1991.
3. Р. Димитријевић, Ј. Манојловић: Анализа реалних функција више променљивих – Збирка Задатака, ПМФ Ниш, Ниш 2004.

Number of active classes				Other classes
Lectures: 3	Practical classes: 3	Other forms of teaching:		

Teaching methods

Lectures (3 classes per week during the semester), calculation exercises (3 classes per week during the semester).

Assessment (maximum 100 points)

Course assignments	**points**	Final exam	**Points**
Lectures	15	oral exam	35
Term papers	15		35
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Total	**30**		70

Two term tests which include theoretical questions and computational problems: 2x30=60 points

Note: By passing both term tests (50% for both theory-related questions and computational problems) the student may obtain a grade before the official exam.