



Taras Shevchenko National
University of Kyiv

Physics Department

Course description

Complex Analysis

Level:	Language:	Duration:	Occurrence:
Bachelor	Ukrainian	1 semester	3 rd semester
Credits:	Total Hours:	Contact Hours:	Self-study Hours:
3	90	45	45

Description of Course Work and Examinations

Module-rating system, results are evaluated on a 100-point scale. The course contains 2 midterms 30 pts/90 min each, an exam on higher complexity problems 10 pts/180 min, and a final exam 30 pts/180 min.

Prerequisites

Mathematical Analysis (1st – 2nd semesters)

Syllabus

Basic Definitions: complex number (CN), complex plane, absolute value and argument of a CN, trigonometric and exponential forms.

Basic Operations: algebraic operations on CNs, CN sequences and limits, limit points, point at infinity, compactification of the complex field, Riemann sphere.

Functions of CNs: function of a complex variable, single- and multivalued functions, branches, branch cuts, continuous functions, analytic functions.

Differentiation and Integration in the Complex Plane: differentiability of a function of a CN, Cauchy-Riemann equations, harmonic functions and harmonic conjugates, Cauchy's differentiation formula, Cauchy's integral theorem, Taylor series, Laurent series on a ring, classification of singularities, asymptotic behavior near singularities, residues, Cauchy's residue theorem, calculation of problematic integrals of real-valued functions, infinite series residue theorem.

Operational Analysis: Fourier and Laplace transforms, theorems of existence, inverse transforms, transforms of common functions, solution of linear ODEs with initial conditions using the Laplace transform.

Literature

1. L.I. Volkovyskyi, G.L. Lunz, I.G. Aramanovich. *Collection of tasks on the theory of functions of a complex variable*. 2002 Moscow, 312 p, ISBN 5-9221-0264-8.

Instructors

Associate Professor Oleh V. Barabash.