

Reference: <https://iitk.ac.in/math/index.php/2014-05-21-10-30-47/courses> (MTH 403)

Syllabus: Pre-requisite: MTH301/Consent of Instructor

Preliminaries to Complex analysis: Basic properties: convergence, compactness, connectedness; continuous functions, Holomorphic functions, power series, integration along curves and properties. Cauchy's theorem and its application: Goursat's theorem, local existence of primitives and Cauchy's theorem in a disc, evaluation of some integrals, Cauchy's integral formulas, Morera's theorem, sequence of holomorphic functions. Meromorphic functions and the Logarithm: Zeros and poles, the residue formula, singularities and meromorphic functions, the argument principle and applications, open mapping theorem, maximum modulus principle, Picard's little theorem, the complex logarithms, harmonic functions. Conformal mappings: Conformal equivalence: the disc and the upper half-plane; The Dirichlet problem in a strip, Schwartz lemma, automorphism of disc, automorphism of the upper half-plane, Montel Theorem, Riemann mapping theorem.

Reference materials:

1. L. V. Ahlfors: Complex analysis, McGraw-Hill international editions.
2. John B. Conway: Functions of one complex variable, Springer International Student Edition.
3. R. Narasimhan, Y. Nievergelt: Complex analysis in one variable, Birkhauser.
4. Walter Rudin: Real and Complex analysis, McGraw-Hill international editions.
5. E. M. Stein and R. Shakarchi: Complex Analysis, Princeton University Press.
6. T. Gamelin: Complex analysis, Springer.

Credits: 11