COMPLEX ANALYSIS SYLLABUS

(1) Basics on complex number systems and geometric interpretations of standard operations on complex numbers. De Moivre's formula, stereographic projections, spherical metric, extended complex plane.

(2) Complex differentiation, polynomial and rational functions, Comparison between real and complex differentiability, C-R equations, sufficient condition for differentiability, conformality, harmonic functions

(3) Linear fractional transformations:
   Complex projective space, notion and basic properties of linear fractional transformations.

(4) Elementary functions: e^z, $\sin z$, $\cos z$, $\sinh z$, $\cosh z$ and their elementary properties, $log z$ as holomorphic function.

(5) Power series: Definition and review of elementary properties of power series.

(6) Easy versions of Cauchy's theorem and its implications:
   (a) Cauchy's theorem for triangles, convex region
   (b) Mean value property
   (c) Cauchy's formula for circle.
   (d) A proof of the Fundamental theorem of Algebra
   (e) Weierstrass Convergence Theorem
   (f) Maximum modulus principle
   (g) Schwarz's lemma
   (h) Existence of harmonic conjugate etc.

(7) Laurent series and isolated singularities.

(8) Statement and consequences of general form of Cauchy's theorem.