COMPLEX ANALYSIS PRELIMINARY EXAMINATION SYLLABUS

September 10, 2004

- Complex numbers, basic properties of holomorphic functions, Cauchy-Riemann equations, harmonic conjugates, elementary functions (e.g., the exponential function, the logarithmic function, and trigonometric functions), linear fractional transformations.

- Complex integrals, Cauchy's theorem, Cauchy's integral formula, Morera's theorem, Liouville's theorem, fundamental theorem of algebra, open mapping theorem, and maximum modulus theorem.

- Taylor and Laurent series, classification of singularities, residue, residue calculation, residue theorem, Argument Principle, Rouche's theorem, and meromorphic functions,

- Schwarz's lemma, Riemann mapping theorem, Casorati-Weterstrass theorem, infinite product, Weierstrass' (factorization) theorem, little and big Picard Theorems.

- Harmonic functions, mean value theorem, and Poisson integral formula.

Reference book:

J. B. Conway: Function of one complex variable, Springer-Verlag, 1978.

J. Noguchi: Introduction to complex analysis, AMS, Translation of Math Monographs, Vol. 168, 1998.

L.V. Ahlfors: Complex Analysis, 3rd Edition. McGraw-Hill, 1966.