Complex Variables II   **Prof. E. Hameiri**

SYLLABUS

Textbook:
   L. Ahlfors: *Complex Analysis*

Recommended:
   J. Brown and R. Churchill: *Complex Variables*
   Z. Nehari: *Conformal Mapping*
   M. Spiegel: *Schaum's Outline: Complex Variables*

I. Properties of Analytic Functions

(i) The argument principle and Rouche's theorem

(ii) The local mapping, the maximum principle, Schwarz's lemma

(iii) Harmonic functions: maximum principle, Poisson's formula, Schwarz's theorem

II. Families of Analytic Functions

(i) Uniform Convergence, Weierstrass' theorem

(ii) Normal families, equicontinuity, Arzela's (Montel's) theorem

III. Infinite Sums and Products

(i) Analyticity at ∞, polynomials, rational functions

(ii) Meromorphic functions, the Mittag-Leffler theorem

(iii) Infinite products of numbers and functions, uniform convergence

(iv) Canonical products, the genus and order of entire functions

(v) The Gamma Function: infinite product and integral representations

IV. **Conformal Mapping**

   (i) Properties of simple mappings: powers, the exponential function, the bilinear map

  (ii) Univalent maps, the Riemann Mapping Theorem

 (iii) Continuity of maps at the domain boundary, the Schwartz Reflection Principle

 (iv) Mapping of Polygons (Schwartz-Christoffel), elliptic integrals

V. **Analytic Continuation**

   (i) Function elements, standard procedure of analytic continuation, continuation along arcs, points of continuation and the natural boundary of analytic functions

  (ii) The monodromy theorem

 (iii) Picard's theorem