MATHEMATICS 165B

INTRODUCTION TO COMPLEX VARIABLES- II

Text: *Complex Variables and Applications, Sixth Edition,* by R.V. Churchill and J.W. Brown

This is the second course in a two quarter introduction to the theory of analytic functions of a complex variable. Topics covered in the second course include the theory of residues, conformal mapping, and applications to physical problems.

TOPICS   SUGGESTED NO. OF
                                                                         50 MIN. CLASSES

Residues and poles……………………………………………………………6
  (Ch. 6 §§ 53-59; Ch. 7, §§ 60-64)

    Definitions, the Residue Theorem, principal part of a function, residues at poles, zeros and poles of order *m*, evaluation of improper real integrals, improper integrals involving sines and cosines, integration through a branch cut.

Mappings by elementary functions……………………………………………6
  (Ch. 8 §§ 68-76; also § 8)

    Linear functions, the function $1/z$, linear fractional transformations, mappings of the upper half plane, the exponential transformation and logarithms, fundamental examples including sin z, z^2 and $z^{1/2}$, square roots of polynomials.

Conformal mapping and its applications…………………………………………7
  (Ch. 9 §§ 79-83; Ch. 10, §§ 84-85, 88, 90)

    Preservation of angles, further properties of analytic functions, harmonic conjugates, transformations of harmonic functions, transformations of boundary conditions, steady state temperature distributions, special considerations in the half plane, electrostatic potential, two-dimensional fluid flow.

Further topics…………………………………………………………………..4
  (Ch. 12 §§ 100-104)

    The Poisson Integral Formula, the Dirichlet problem for a disk, related boundary value problems.