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.

TOPICS

SUGGESTED NO. OF
50 MIN. CLASSES

Infinite series expansions 5
(Ch. 5, §§ 43–49,52)

Convergence, Taylor and Laurent series, examples, absolute and uniform convergence of series, integration and differentiation of power series, analytic continuation.

Residues and poles 6
(Ch. 6,7, §§ 53–64)

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, §§ 68–78)

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 5
(Ch. 9, §§ 79–83)

Preservation of angles, further properties of analytic functions, harmonic conjugates, transformations of harmonic functions, transformations of boundary conditions.

Poisson formula 2
(Ch. 12, §§100–101)

The Poisson Integral Formula, Dirichlet problem.

40 Homework problems 20%, midterm 30%, Final 50%.