

# MATHEMATICS 165B

## INTRODUCTION TO COMPLEX VARIABLES II

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

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

Series .....5  
(Ch. 5, §§ 60–67)

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

Residues and poles ..... 10  
(Ch. 6,7, §§ 68–87)

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 ..... 5  
(Ch. 8, §§ 90–98)

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 ..... 4  
(Ch. 9, §§ 101–106)

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

Poisson formula ..... 2  
(Ch. 12, §§ 123–124)

The Poisson Integral Formula, Dirichlet problem.

40 Homework problems 10%, midterm 30%, Final 60%.