

MATHEMATICS 165A

INTRODUCTION TO COMPLEX VARIABLES - I

Text: *Complex Variables and Applications, 6th edition*, by Brown and Churchill

This is the first course in a two quarter introduction to the theory of analytic functions of a complex variable. Topics covered in the first course include mappings by elementary functions, complex integrals, Cauchy's Theorem, power series and Laurent series.

TOPICS	SUGGESTED NO. OF 50 MIN. CLASSES
Complex numbers.....5 (Ch. 1 §§ 1-8) Algebra and geometry of complex numbers, polar and exponential forms, complex powers and roots, regions in the complex plane.	
Analytic functions.....4 (Ch. 2 §§ 9-22) Functions of a complex variable, interpretation as mappings, limits over the complex numbers, the point at infinity, continuity, derivatives and differentiation formulas, the Cauchy-Riemann equations, polar coordinates, analytic and harmonic functions.	
Elementary transcendental functions over the complex numbers.....4 (Ch. 3 §§ 23-29) The complex exponential function and its properties, trigonometric functions, hyperbolic functions, the logarithmic function and its branches, complex exponents, inverse trigonometric and hyperbolic functions.	
Integration of analytic functions.....8 (Ch. 4 §§ 30-42) Contours and contour integral, antiderivatives, the Cauchy-Goursat Theorem, modifications for multiply connected domains, Cauchy Integral Formula, derivatives of analytic functions, Morera's Theorem, Maximum Modulus Theorem, Liouville's Theorem and the Fundamental Theorem of Algebra	
Infinite series expansions.....4 (Ch. 5 §§ 43-52) Convergence, Taylor and Laurent series, examples, absolute and uniform convergence of series, integration and differentiation of power series, uniqueness of series expansions, multiplication and division of power series.	