OFFICIAL SYLLABUS

451-INTRODUCTION TO COMPLEX ANALYSIS

Catalog Description

Analytic functions, Cauchy-Riemann equations, harmonic functions, elements of conformal mapping, line integrals, Cauchy-Goursat theorem, Cauchy integral formula, power series, the residue theorem and applications. Prerequisites: 350 with grade of C or better or consent of instructor.

Textbook

Complex Variables and Applications, 8th Edition by Brown & Churchill.

Course Outline and Topics

Chapter 1. Complex Numbers

Algebraic properties of complex numbers, modules, roots of complex numbers, regions in the complex plane.

Chapter 2. Analytic Functions

Function of a complex numbers, mappings, limits, theorems on limits, continuity, derivatives, Cauchy-Riemann conditions, analytic functions, and harmonic functions.

Chapter 3. Elementary Functions

Exponential and logarithmic functions, branch cuts, complex exponents, trigonometric and hyperbolic functions and their inverse functions.

Chapter 4. Integrals

Derivatives of *w(t),* definite integral, contour integrals, Cauchy-Goursat theorem, Cauchy Integral formula, Liouville's theorem and fundamental theorem of algebra, maximum modulus principle.

Chapter 5. Series and Sequences

Convergence of series, sequences, Taylor and Laurent series, uniform convergence of power series.

Chapter 6. Residues and Poles

Residues, Cauchy's Residue Theorem, poles.

Chapter 7. Applications of Residues

Evaluation of Improper Integrals, Improper Integrals from Fourier analysis.

Chapter 8. Mapping by Elementary Functions (optional)

Any instructor should cover all of the material specified, additional sections are optional.

Students' grades in the class are based on exams, classroom presentations, and written homework assignments. Graduate students taking the class are given extra written assignments and oral presentations.