

San Francisco State University
Department of Mathematics
Course Syllabus

MATH 730
Complex Analysis

Prerequisites

MATH 380, 450 and 470 or equivalent.

Bulletin Description

Graduate Complex Analysis: analytic functions, complex integration, Cauchy's Theorem, the Maximum Modulus Principle, Liouville's Theorem, harmonic functions, Taylor and Laurent series, singularities, the Residue Theorem, conformal mapping, normal families, the Riemann Mapping Theorem.

Course Objectives

The main objective of Complex Analysis is to study the development of functions of one complex variable. Students will perform a thorough investigation of the major theorems of complex analysis – the Cauchy-Riemann Equations, Cauchy's Theorem, Cauchy's Integral Formula, the Maximum Modulus Principle, Liouville's Theorem, the Residue Theorem, Rouché's Theorem, the Riemann Mapping Theorem – including their proofs. They will also apply these ideas to a wide range of problems that include the evaluation of both complex line integrals and real integrals.

Upon successful completion of the course, students should be able to

- Prove the above theorems
- Solve difficult problems using the above theorems
- Apply Cauchy's Integral Formula to evaluate complex line integrals
- Expand functions in Taylor and Laurent series
- Apply the Residue Theorem to evaluate real integrals
- Apply normal families arguments in proofs

Evaluation of Students

Students will be evaluated on their ability to devise, organize and present complete solutions to problems. While instructors may design their own methods of evaluating student performance, these methods may include in-class examinations, homework assignments and a final exam.

Course Outline

Topics	Number of Weeks
Analytic Functions	2
Complex Integration	2
Cauchy's Theorem and its Consequences	3
Harmonic Functions	1.5
Sequences and Series of Analytic Functions	2
Isolated Singularities	2.5
Conformal Mapping	2

Textbooks and Software

An Introduction to Complex Function Theory, by Bruce Palka

Complex Analysis, by Lars Ahlfors (3rd edition)

Functions of One Complex Variable, by John Conway

Complex Analysis, by Serge Lang (4th edition)

Submitted by: Alex Schuster Date: May 7, 2003