CATALOG DESCRIPTION:

Math 01.513 Complex Analysis II 3. s.h.
(Prerequisites: Math 01.512 Complex Analysis I)

This course will cover advanced topics in complex analysis: Laurent series, meromorphic functions, conformal mappings, analytic continuation, fractional linear transformations and elliptic functions.

CONTENT:

1. Laurent Series

   1.1 Residue theorems
   1.2 Application to Real Analysis
   1.3 Behavior of functions in neighborhoods of isolated singularities
   1.4 Casorati-Weierstrass Theorem and Picard's Theorem

2. Entire Functions

   2.1 Fundamental properties
   2.2 Picard's First Theorem
   2.3 Infinite products
   2.4 Weierstrass' Factor Theorem

3. Meromorphic Functions

   3.1 Poles and zeros of Meromorphic Functions
   3.2 Rational functions
   3.3 Mittag-Leffler Theorem
   3.4 The Gamma Function

4. Conformal Mappings

   4.1 Analyticity from a mapping point of view
   4.2 Elementary mapping problems
   4.3 Critical points and magnification
   4.4 Riemann Mapping Theorem

5. Analytic Continuation

   5.1 Uniqueness of Analytic Continuation
5.2 Natural Boundary
5.3 Principle of Reflection
5.4 Monodromy Theorem

6. Fractional Linear Transformations

6.1 Group properties and matrix representations
6.2 Invariance, fixed points and inversions
6.3 Cross ratios
6.4 F.L.T. of a half plane into the interior of a circle

7. Periodic Functions

7.1 Simple periodic functions
7.2 Doubly periodic functions
7.3 Period points
7.4 Elliptic functions

8. Special Topics

8.1 Rouche's Theorem
8.2 Hurwitz's Theorem
8.3 Schwartz's Theorem
8.4 Riemann surfaces and multiple-valued functions

TEXTS:
