

Syllabus
Math 01.513 - Complex Analysis II

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

TEXTS:

Boas, R.P., INVITATION TO COMPLEX ANALYSIS, Random House, New York, 1987.

Churchill, Brown and Verhey, COMPLEX VARIABLES AND APPLICATIONS, 5th ed., McGraw-Hill, NY, 1990.

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