ROWAN UNIVERSITY
Department of Mathematics

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 is a continuation of Complex Analysis I. It covers more advanced topics in the area: Laurent series, meromorphic functions, conformal mappings, analytic continuation, fractional linear transformations, elliptic functions and others.

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 Muttag-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:

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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