ROWAN UNIVERSITY
Department of Mathematics

Syllabus
Math 01.512 - Complex Analysis I

CATALOG DESCRIPTION:

Math 01.512 Complex Analysis I, 3 s.h.

This course studies the theory and application of functions of a complex variable. Topics include derivatives, analytic functions, complex exponential, trigonometric and logarithmic functions, integrals of complex functions, Cauchy's integral theorems, poles and residues, power series and conformal mapping.

OBJECTIVES:

This course is intended to provide a sufficient background in complex analysis for students who did not, as undergraduates, become acquainted with this area of mathematics. As complex analysis is intimately connected to Geometry and Real Analysis, this course will not only expand the students' knowledge in mathematics, but also exhibit to them the relations of its content to other areas within mathematics and beyond.

CONTENT:

1. Introduction

- 1.1 The complex numbers as a non-ordered field
- 1.2 Elementary algebraic and geometric properties
- 1.3 Complex sequences

2. Functions

- 2.1 Functions and continuous functions
- 2.2 Limits
- 2.3 Uniformly continuous functions
- 2.4 Exp(z), Sin(z), Cos(z), Log(z)

3. Analytic Functions

- 3.1 Derivatives and elementary properties
- 3.2 Cauchy-Riemann partial differential equations
- 3.3 Theorems concerning analytical functions

4. Integrals

- 4.1 Curves and parametrization of curves
- 4.2 Properties of integrals
- 4.3 Basic integral theorems, including Cauchy's theorem and Morera's theorem

5. Cauchy Integral Formula

5.1 Derivative formula
5.2 Liouville theorem
5.3 Fundamental theorem of algebra
5.4 Maximum modulus theorem

TEXTS:

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

Churchill, Brown and Verhy, COMPLEX VARIABLES AND APPLICATIONS, 5th ed., McGraw-Hill Book Company, New York, 1990.

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Edited: 04/2021