ROWAN UNIVERSITY
Department of Mathematics

Syllabus
Math 01.430 - Introduction to Complex Analysis

CATALOG DESCRIPTION:

Math 01.430 Introduction to Complex Analysis, 3 s.h.
Prerequisite: Math 01.330 (Introduction to Real Analysis I) with a grade C- or better

This course is about functions of a single complex variable. Topics includes the properties and geometric interpretations of complex numbers; the concepts of the limit, continuity and derivative of those functions; and the complex versions of exponential, trigonometric and logarithmic functions. Also included are: integration of complex functions, the Cauchy integral theorems, uniform convergence, Taylor's and Laurent's series and conformal mapping.

OBJECTIVES:

This course is intended to provide an introduction to Complex Analysis for majors in mathematics, physics or engineering. As one of preparations for more advanced studies, it is a course of particular importance to students of both pure and applied mathematics who are considering graduate training. While proofs of selected theorems are given, stress is more on important examples, ideas, techniques and applications.

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

5. The Cauchy Integral Formula
- 5.1 Derivative formula
- 5.2 Liouville theorem

5.3 Fundamental theorem of algebra
5.4 Maximum modulus theorem

TEXTS:

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

Bak and Newman, *COMPLEX ANALYSIS* (2nd ed), Springer, NY,NY,1997

Spiegel, Murray, *COMPLEX VARIABLES* (Schaun's Outline Series) MacGraw-Hill, NY,NY, 1964 (still available in 2001)

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