Tennessee Technological University
Mathematics Department

MATH 6310-6320: Complex Analysis I-II

I. COURSE DESCRIPTION FROM CATALOG:

Complex numbers, calculus of complex variables, analytic function. Cauchy's Theorem and complex integration, power series including Taylor's and Laurent's, residue theory with applications, conformal mapping with physical applications. Lec. 3. Cr. 3.

II. PREREQUISITE(S):

MATH 6310: C or better in MATH 4120 or MATH 5120 or consent of instructor.
MATH 6320: C or better in MATH 6310.

III. COURSE OBJECTIVE(S):

This is a first course of the theory of functions and complex variables. Topics to be covered include analytic functions, Cauchy's Theorems and complex integration, power series including Taylor's and Laurent's, residue theory with applications and conformal mapping with physical applications.

IV. STUDENT LEARNING OUTCOMES:

On satisfying the requirements of this course, students will have the knowledge and skills to:

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1) Define and analyze limits and continuity for complex functions as well as consequences of continuity and analyticity.
2) Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions in various contexts: be able to prove the the fundamental theorem of algebra.
3) Be able to state and apply the various versions of the Cauchy integral theorem and the Cauchy integral formula, as well as apply these theorems to the computation of contour integrals.
4) Represent functions as power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.

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5) Be able to state the Maximum Modulus principle and demonstrate its applications.
6) Be able to explain the concept of a space of analytic functions and discuss applications of this concept in the proof of Riemann conformal mapping theorem.
7) Be able to state the Riemann conformal mapping and Weierstrass product theorems and demonstrate their corollaries.

V. TOPICS TO BE COVERED: (Time Permitting)

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I. The Complex Number System
II. Metric Spaces and the Topology of C

III. Elementary Properties and Examples of Analytic Functions
IV. Complex Integration
V. Singularities

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VI. The Maximum Modulus Theorem
VII. Compactness and Convergence in the Space of Analytic Functions
VIII. Runge's Theorem
XI. Entire Functions

VI. ADDITIONAL INFORMATION:

VII. POSSIBLE TEXTS AND REFERENCES:

Functions of One Complex Variable, 2nd edition, John B. Conway

VIII. ANY TECHNOLOGY THAT MAY BE USED:

IX. STUDENT ACADEMIC MISCONDUCT POLICY

Maintaining high standards of academic integrity in every class at Tennessee Tech is critical to the reputation of Tennessee Tech, its students, alumni, and the employers of Tennessee Tech graduates. The Student Academic Misconduct Policy describes the definitions of academic misconduct and policies and procedures for addressing Academic Misconduct at Tennessee Tech. For details, view the Tennessee Tech's Policy 217 – Student Academic Misconduct at Policy Central.

X. DISABILITY ACCOMMODATION

Students with a disability requiring accommodations should contact the Accessible Education Center (AEC). An Accommodation Request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The AEC is located in the Roaden University Center, Room 112; phone 931-372-6119. For details, view the Tennessee Tech's Policy 340 – Services for Students with Disabilities at Policy Central.