Tennessee Technological University
Mathematics Department

MATH 6510: Finite Difference Solutions of Partial Differential Equations

I. COURSE DESCRIPTION FROM CATALOG:

Approximate solutions of boundary and initial value problems using the finite difference method. Elliptic, parabolic, and hyperbolic PDE's. Numerical differentiation. Solution methods for linear systems. Lec. 3. Cr. 3.

II. PREREQUISITE(S):

C or better in MATH 4510 or MATH 5510 or consent of instructor.

III. COURSE OBJECTIVE(S):

This course is designed to provide the graduate student in mathematics, engineering or science an introduction to the finite difference method as a means to finding approximate solutions of ordinary and partial and differential equations. Various types of equations and conditions are considered.

IV. STUDENT LEARNING OUTCOMES:

Upon successful completion of the course students will be able to:

- use Taylor's theorem and Taylor polynomials for approximating various functions
- derive finite difference methods to solve elliptic, parabolic, and hyperbolic partial differential equations
- calculate finite difference solutions of elliptic, parabolic, and hyperbolic partial differential equations
- theoretically analyze finite difference methods in terms of stability, consistency and convergence

V. TOPICS TO BE COVERED:

Approximation solutions of boundary and initial value problems using the finite difference method. Elliptic, parabolic, and hyperbolic PDE's. Numerical differentiation. Solution methods for linear systems.

VI. ADDITIONAL INFORMATION:

VII. POSSIBLE TEXTS AND REFERENCES:

Discrete Numerical Methods in Physics and Engineering, by Donald Greenspan.

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.