

**Tennessee Technological University
Mathematics Department**

MATH 6520: Finite Element Solutions of Partial Differential Equations

I. COURSE DESCRIPTION FROM CATALOG:

Mathematical foundations of the finite element method. Approximate solutions of PDE's. Polynomial interpolation. Variational techniques. Numerical integration. Solution methods for linear systems. Isoparametric technique. 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 an introduction to the mathematical foundations of the finite element method as a means to finding approximate solutions of ordinary and partial differential equations.

IV. STUDENT LEARNING OUTCOMES:

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

- use piecewise polynomial interpolation and the appropriate error bounds in approximating various functions
- derive finite element methods to solve elliptic, parabolic, and hyperbolic partial differential equations
- calculate finite element solutions of elliptic, parabolic, and hyperbolic partial differential equations
- theoretically analyze finite element methods in terms of stability, consistency and convergence

V. TOPICS TO BE COVERED:

Approximation solutions of boundary and initial value problems in 2 and 3 dimensions using the finite element method. Polynomial interpolation, variational techniques, numerical differentiation and integration, linear systems solution methods.

VI. ADDITIONAL INFORMATION:

VII. POSSIBLE TEXTS AND REFERENCES:

Numerical Analysis of the F.E.M., by Ciarlet

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](#).