Tennessee Technological University
Mathematics Department

MATH 4510/5510: Advanced Mathematics for Engineers

I. COURSE DESCRIPTION FROM CATALOG:
Fourier Series, Sturm-Liouville Problems, Orthogonal Functions, Bessel Equations, Legendre Equations, Separable Partial Differential Equations (e.g. Heat, Wave, and Laplace Equations), and Other Topics. **Lec. 3-3. Cr. 3-3.**

II. PREREQUISITE(S):
C or better in **MATH 2110** and **MATH 2120**.

III. COURSE OBJECTIVE(S):
This course is designed to introduce the student to Fourier Series, the method of solution of partial differential equations by separation of variables, and the application of these techniques to certain problems of mathematical physics and engineering.

IV. STUDENT LEARNING OUTCOMES:
Upon successful completion of the course, students will understand the underlying concepts supporting, as well as the methods used for the solution of general linear differential equations (to include Bessel's and Legendre equations) that are both ordinary as well as having regular singular points. Students will understand the concepts of the generalized inner product, orthogonality and the Sturm-Liouville problem. Students will be able to apply these concepts to applied topics including the Fourier Series and Partial Differential Equations (heat, wave, laplace) in one and two dimensions and multiple coordinate systems.

V. TOPICS TO BE COVERED:

- Series Solutions of Linear Equations (review)
- Orthogonal Functions and Fourier Series
- Sturm-Liouville Problems
- Bessel and Legendre Series and Equations
- Boundary-Value Problems in Rectangular Coordinates
- Boundary-Value Problems in Other Coordinates
- Integral Transform Method (optional)

VI. POSSIBLE TEXTS AND REFERENCES:
Differential Equations with Boundary-Value Problems, 9th edition, by Dennis G. Zill and Michael R. Cullen, Brooks/Cole

VII. 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.

VIII. 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.