1. EM424 Analytical Methods for Mechanics

2. 3 Credit Hours / 3 Contact Hours

3. Course Director: Prof. John Burkhardt

4. Text book: *Advanced Engineering Mathematics*, 7th Ed. (Jones and Bartlett Learning)

5. Specific course information
    a. Review of solution methods to frequently encountered engineering problems such as cylindrical and spherical heat conduction, wave dynamics, boundary layers and vibrations. The solutions methods focus on problems encountered in solid mechanics, fluids mechanics and heat transfer. Includes both analytical and numerical problem solving techniques.
    b. Prerequisites: SM212 Differential Equations
    Co-requisites: None
    c. This course is <u>required</u> for the Nuclear Engineering program.

6. Educational objectives for the course
    a. Derive solutions to ordinary differential equations with variable coefficients using power series and represent them in terms of recurrence relationships.
    b. Determine the eigenvalues, eigenfunctions and orthogonality relationship of a Sturm-Liouville problem.
    c. Apply trigonometric-, Bessel- and Legendre-Fourier series for the representation of periodic and nonperiodic functions, respectively.
    d. Solve linear partial differential equations in rectangular, polar and spherical coordinates using trigonometric-, Bessel- and Legendre-Fourier series.

7. Specific program outcomes address by this course

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Introduced							
Reinforced	X						
Mastered							

8. Brief list of topics to be covered
    a. Ordinary differential equations including Power Series Solutions
    b. Legendre Polynomials and Bessel Functions
    c. Orthogonal Functions
    d. Generalized Fourier Series
    e. Sturm-Liouville Problems
    f. Partial Differential Equations / Boundary Value Problems