AME 526: Engineering Analytical Methods
Summer 2014, Course Syllabus

TEXTBOOK: *Fourier Analysis, Eigenfunction Expansions and Differential Equations* – by SS Sadhal
Publisher: Mathematics Education for Engineering (ISBN: 978-0-9913683-0-3).

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DATE	Lec. No.	TOPICS
May 22	1	Review of Ordinary Differential Equations. Solution of homogeneous equations with constant coefficients. Solution of nonhomogeneous equations by the method of undetermined coefficients. Homogeneous and non-homogeneous Euler equation.
May 27	2	The method of variation of parameters for general second order equations. Problems with variable coefficients. The method of Frobenius. Legendre's equation and Bessel's equation .
May 29	3	Introduction to Fourier series. Representation of piecewise continuous functions as sine and/or cosine series.
June 3	4	Double and multiple Fourier series. Fourier integrals and Fourier transforms
June 5	5	Introduction to Partial Differential Equations. Classification of Partial Differential Equations -- parabolic, elliptic and hyperbolic equations. Boundary conditions. Wave equation, D'Alembert's solution. The method of characteristics
June 10	6	The method of separation of variables.Laplace's equation, the diffusion equation, wave equation. Application of Fourier series to partial differential equations.
June 11		***Mid-term Examination*** **(2:00-4:00pm)**
June 12	7	Linear problems with three independent variables. Sturm-Liouville theory. Orthogonal eigenfunctions. Classification of boundary conditions for orthogonality
June 17	8	Partial Differential Equations in cylindrical coordinates.
June 19	9	Bessel functions. Fourier-Bessel series. Steady-state and time-dependent problems involving cylinders.
June 24	10	Problems in spherical geometry. Legendre polynomials. Fourier-Legendre series. Spherical Bessel functions for time-dependent problems.
June 26	11	Non-homogeneous Partial Differential Equations. Problems in elasticity, heat conduction, electrostatics and fluid mechanics. The method of eigenfunction expansions.
July 1		***Final Examination***