Department of Mathematics & Statistics, KFUPM

Math 301 Syllabus (072)

Dr. K. M. Furati

Course Title: Methods of Applied Mathematics

Textbook: Advanced Engineering Mathematics by Zill and Cullen (3nd Edition, 2006)

Course Description: Special functions. Bessel's functions and Legendre polynomials. Vector analysis including vector fields, divergence, curl, line and surface integrals, Green's, Gauss' and Stokes' theorems. Systems of differential equations. Sturm-Liouville theory. Fourier series and transforms. Introduction to partial differential equations and boundary value problems.

Wk	Date	Sec	Material	Homework
1	Feb 16 – 20	9.1	Vector Functions	3,11,20,25,28,41
		9.5	The Directional Derivative	3,6,9,13,21,30
		9.7	Divergence and Curl	8,14,23,30
2	Feb 23 – 27	9.8	Line Integrals	5,10,16,22,30
		9.9	Independent of Path	7,15,18,23,28
3	Mar 01 – 05	9.12	Green's Theorem	2,6,17,25
		9.13	Surface Integrals	3,11,26,33
4	Mar 08 – 12	9.14	Stokes' Theorem	3,6,14,17
		9.16	Divergence Theorem	2,4,11
5	Mar 15 – 19	4.1	Definition of the Laplace transform	3,5,17, 29,38,40
		4.2	Inverse Transform, Transforms of Derivatives	5,13,15,19,35,36
6	Mar 22 – 26	4.3	Translation Theorems	8,13,20,24, 47,60,66
		4.4	Additional Operational Properties	5,16,19,23,34, 45
		4.5	Dirac Delta Function	4,8,12
7	Mar 29 – Apr 02	12.1	Orthogonal Functions	6,12,16,18
		12.2	Fourier Series	4,6,16,20
8	Apr 05 – 09	12.3	Fourier Cosine and Sine Series	4,6,14,16,26,38
		12.4	Complex Fourier Series	2,4,6,11
April 12 – 16 Midterm Break				
9	Apr 19 – 23	12.5	Sturm-Liouville Problem	2,4,6,8,14
10	Apr 26 – 30	12.6	Bessel and Legendre Series	2,4,6,8,10,20
11	May 03 – 07	13.1	Separable Partial Differential Equation	2,10,14,18,20,24,28
		13.3	Heat Equation	2,4,6
12	May 10 – 14	13.4	Wave Equation	2,4,6,8,10
		13.5	Laplace's Equation	2,4,8,10,14
13	May 17 – 21	14.1	Problems in Polar Coordinates	3,4,9,10
		14.2	Problems in Polar and Cylindrical Coordinates	2,4,8,10
14	May 24 – 28	14.3	Problems in Spherical Coordinates	4,6,12
		15.2	Applications of the Laplace Transform	6,8,10,14,27
15	May 31 – Jun 04	15.3	Fourier Integral	4,8,12,18
		15.4	Fourier Transforms	6,10,12,18