Department of Mathematics & Statistics, KFUPM

Math 568 Syllabus (081)

Dr. K. M. Furati

Course Title: Advanced Partial Differential Equations I

Textbook: Partial Differential Equations: Methods & Applications, R. McOwen, 2nd Ed.

Course Description: First order linear and nonlinear equations. Classification of Second order equations. The wave equation, heat equation and Laplace's equation. Green's functions, conformal mapping. Separation of variables, Sturm-Liouville theory. Maximum principles and regularity theorems.

Ch.	Title	# Wks	Sec	Title	HW
–	Introduction	1	–	Definitions and Notation	……
1	First-Order Equation	3	1.1	Cauchy Problem for Quasilinear Equations	3, 4c, 6a, 7a
			1.2	Weak Solutions for Quasilinear Equations	3, 5
			1.3	General Nonlinear Equations	2, 3
2	Principles for Higher-Order Equation	2	2.1	The Cauchy Problem	1, 2, 4
			2.2	Second-Order Equations in Two Variables	1, 2
			2.3	Linear Equations and Generalized Solutions	3
3	The Wave Equation	3	3.1	The One-Dimensional Wave Equation	2, 4
			3.2	Higher Dimensions	2, 3
			3.3	Energy Method	1, 2
			3.4	Lower Order Terms	4
4	The Laplace Equation	3	4.1	Introduction	3, 5
			4.2	Potential Theory and Green's Function	6
			4.4	Eigenvalues of the Laplacian	7
5	The Heat Equation	2	5.1	The Heat Equation in a Bounded Domain	3, 7
			5.2	Initial-Value Problem	3, 5
			5.3	Regularity and Similarity	…….
–	Extras	1	–	……..	

Grading:

	%
HW	30
Midterm	30
Final	40