Partial Differential Equations (MSM4454)

Course Code	MSM4454								
Course Name	Partial Differential Equations								
Credit Hour	4								
Prerequisite Course	Computational Methods in Industry (MSM4413)								
Contact Hours	Lecture:			4	units	(4 hour(s) per week)			
	Tutorial:			0	unit	(0 hour(s) per week)			
	Laboratory:			0	unit	(0 hour(s) per week)			
Rationale for the Inclusion	The problem arise in physical phenomena are widely involve partial differential equations (PDEs). Hence, this course is designed to strengthen the fundamental knowledge of PDEs which lead to understanding to the real problem in life.								
Course Objective	To equip students with the concepts of partial differential equations and how to solve linear Partial Differential with different methods. Students also will be Introduced to some physical problems in Engineering models that results in partial differential equations.								
Course Synopsis	This course will focus on the formulation of first and second order partial differential equations(PDEs) for three basic types of hyperbolic, parabolic and elliptic equations. The concentration is on concrete examples and problem solving of PDEs which include heat, wave and Laplace' s equation that arise in various physical systems. It also covers finite difference schemes, Green's functions and perturbation methods for elliptic, parabolic and hyperbolic equations. In addition, this course also includes numerical methods for PDEs that emphasis on finite difference and finite element methods. The main numerical issues such as convergence and stability will also be discussed. Study on real case study such as current stock price and bioengineering problem will be carried out and the solution will be attained using MATLAB Software.								
Program Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
	/	/	/					/	
Soft Skills	**Code**		**CTPS**	**CS**	**TS**	**LL**	**ES**	**EM**	**LS**
	KIM		4					3	
Course Outcomes	By the end of semester, students should be able to:								
	CO1	Classify the fundamental principals of partial differential equations(PDEs) to solve hyperbolic, parabolic and elliptic equations.							
	CO2	Formulate appropriate numerical methods for solving various problems in partial differential equations.							
	CO3	Adapt mathematical software to solve various problems in partial differential equations.							
	CO4	Practise ethical and professionalisme in technical report writing and presentation.							
Assessment Methods	**Methods**		**Weighting**	**CO1**	**CO2**	**CO3**	**CO4**		
	Assignment/ Project		30%	/	/	/	/		
	Test		30%	/	/				

	Final Examination	40%	/	/			
	Total	**100%**					

Learning References	1	Smith, G.D. (1978), The Numerical Solutions of Partial Differential Equations, Oxford University Press (Latest version-Main Reference)
	2	Zauderer, E, (2006), Partial Differential Equations of Applied Mathematics, third edition, John Wiley (Latest version).
	3	Morton, K.W. and Mayers, D.F. (2005), Numerical Solution of Partial Differential Equations: An Introduction, Cambridge University Press (Latest version).
	4	Gockenbach, M. S. (2002), Partial Differential Equations: Analytical and Numerical Methods, SIAM (Latest version).
	5	J.Kevorkian (1990) Partial Differential Equations: Analytical Solution Techniques. Wadsworth and Brooks (Latest version).