

Course Title	Differential Equations	Course Code	MT1006
Department	Department of Electrical Engineering (DEE)	Campus	Lahore
Knowledge Profile	Mathematics & Computing (WK2)	Credit Hrs.	3
Knowledge Area	Mathematics (KA10)	Grading Scheme	Relative
HEC Knowledge Area	Natural Sciences	Applicable From	Spring 2023
Pre-requisite(s)	MT1001 Applied Calculus		

Course Objective	Develop a sound understanding of solutions of Differential Equations with their applications. Understand the concept of Laplace Transformations and Series Solutions.
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No.	Assigned Program Learning Outcome (PLO)
2	An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering science.

I = Introduction, R = Reinforcement

E = Evaluation, A = Assignment, Q = Quiz, M = Midterm, F=Final, L = Lab, P = Project, W = Written Report.

No.	Course Learning Outcome (CLO) Statements	Assessment Tools	Taxonomy Levels	PLO
1	Discuss the basic concepts and notions of Differential Equations (DEs).	Q1, M1	C2	2
2	Determine the solutions of 1st order DEs and higher order DEs	A1, Q2, M1, M2, F	C6	2
3	Formulate DEs with applications	A2, Q2, M2	C5	2
4	Solve problems using Laplace Transform	Q3, A3, F	C3	2
5	Use the concept of series to appraise the solutions of DEs.	A4, F	C3	2

Text Books	Title	A First Course in Differential Equation with modeling Application
	Author	Dennis G. Zill
	Publisher	BROOKS/COLE CENGAGE learning, 9th edition
Reference Books	Title	Advance Engineering Mathematics
	Author	Erwin Kreyszig
	Publisher	Johan Wiley & Sons, 9th Edition, 2006
	Title	Elementary Differential equation with boundary value problem
	Author	Boyce & Diprima
	Publisher	John Wiley & Sons, Inc.

Week	Course Contents/Topics	Chapter*	CLO*
1	Definitions and Terminologies Initial values problem	1.1, 1.2	1, 2
2	Separable variables Linear equations	2.2,2.3	1
3	Exact Equations Solution by substitutions	2.4, 2.5	2
4	Linear Models (First Order Differential Equations), Non-linear models	3.1 ,3.2	2, 3
5	Preliminary Theory-Linear equations, Homogeneous and non-homogeneous equations	4.1	2, 3
6	Reduction of order	4.2	2
7	Homogeneous equations with constant coefficients, Undetermined Coefficients-Superposition approach	4.3 ,4.4	2
8	Undetermined coefficients-Annihilator approach, Variation of parameters	4.5 ,4.6	2
9	Cauchy Euler equation, Linear Models (Higher Order Differential Equations	4.7 ,5.1	3
10	Spring/Mass system: Free Un damped Motion, Spring/Mass system: Free damped Motion	5.1	3
11	Linear Models: Boundary value problems	5.2	3
12	Solution about ordinary points, Solution about Singular point	6.1 ,6.2	5
13	Special Functions	6.3	5
14	Laplace transform, Inverse Laplace transform	7.1 ,7.2	4
15	Operational properties-I Operational properties-II	7.3 ,7.4	4

*Reference book chapters are given in brackets

Assessment Tools	Weightage
Quizzes, Assignments	20.0%
Midterms (I+II)	30.0%
Final Exam	50.0%